SmartSwitch 2000
User's Guide

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Chapter 1

Introduction

How to use this guide; related guides; software conventions; getting help

Welcome to the ***SmartSwitch 2000 User's Guide.*** We have designed this guide to serve as a reference for using the SmartSwitch 2000 family of devices. The SmartSwitch 2000 product family consists of several models of standalone high-speed network devices. By default, these devices perform traditional switching (or bridging); each can also be configured to perform prestandard IEEE 802.1Q VLAN switching (a.k.a "port-based VLAN" switching) or SecureFast switching (activated via Local Management).

The SmartSwitch 2000 family of devices includes:

- The **2E42-27** and **2E42-27R** SmartSwitches, which have a total of 27 ports consisting of 24 built-in front panel RJ45 ports, two front panel slots for optional Fast Ethernet Port Interface Modules (FEPIMs) to support an uplink to 100 Mbps Ethernet backbones or a high speed connection to a local server, and one additional slot for a High Speed Interface Module (HSIM) which can provide FDDI, ATM, Gigabit Ethernet, or WAN connectivity depending on the type of HSIM installed. The only difference between the two devices is that the 2E42-27 supports a single power supply, and the 2E42-27R supports dual, redundant power supplies.
- The **2E43-27** and **2E43-27R** SmartSwitches, which have a total of 27 ports consisting of two RJ21 Connectors (which provide 24 switched Ethernet connections), two front panel slots for optional Fast Ethernet Port Interface Modules (FEPIMs) to support an uplink to 100 Mbps Ethernet backbones or a high speed connection to a local server, and one additional slot for a High Speed Interface Module (HSIM) which can provide FDDI, ATM, Gigabit Ethernet, or WAN connectivity depending on the type of HSIM installed. The only difference between the two devices is that the 2E43-27 supports a single power supply, and the 2E43-27R supports dual, redundant power supplies.
- The **2E43-51** and **2E43-51R** SmartSwitches, which are 48 port MicroLAN Ethernet switches (4 MicroLANs of 12 ports each, via four RJ21 Telco connectors) with two front panel slots for optional Fast Ethernet Port Interface Modules (FEPIMs) to support an uplink to 100 Mbps Ethernet backbones or a

high speed connection to a local server, and one additional slot for a High Speed Interface Module (HSIM) which can provide FDDI, ATM, Gigabit Ethernet, or WAN connectivity depending on the type of HSIM installed. The only difference between the two devices is that the 2E43-51 supports a single power supply, and the 2E43-51R supports dual, redundant power supplies.

- The **2H23-50R** SmartSwitch is a 48 port MicroLAN 10/100 Mbps Ethernet switch (4 separately repeated MicroLANs of 12 ports each, via four RJ21 Telco connectors). The 2H23-50R also provides two FEPIM slots for uplinks, and features redundant internal power supplies.
- The **2H33-37R** SmartSwitch is a 36 port MicroLAN 10/100 Mbps Ethernet switch (3 separately repeated MicroLANs of 12 ports each, via RJ21 Telco connectors). A single HSIM slot is also provided, as are redundant internal power supplies.
- The **2E48-27** and **2E48-27R** SmartSwitches, which have a total of 27 ports consisting of 24 built-in front panel 10Base-FL multimode fiber ST ports, two front panel slots for optional Fast Ethernet Port Interface Modules (FEPIMs) to support an uplink to 100 Mbps Ethernet backbones or a high speed connection to a local server, and one additional slot for a High Speed Interface Module (HSIM) which can provide FDDI, ATM, Gigabit Ethernet, or WAN connectivity depending on the type of HSIM installed. The only difference between the two devices is that the 2E48-27 supports a single power supply, and the 2E48-27R supports dual, redundant power supplies.
- The **2E49-27** and **2E49-27R** SmartSwitches, which have a total of 27 ports consisting of 24 built-in front panel 10Base-FL single mode fiber ST ports, two front panel slots for optional Fast Ethernet Port Interface Modules (FEPIMs) to support an uplink to 100 Mbps Ethernet backbones or a high speed connection to a local server, and one additional slot for a High Speed Interface Module (HSIM) which can provide FDDI, ATM, Gigabit Ethernet, or WAN connectivity depending on the type of HSIM installed. The only difference between the two devices is that the 2E49-27 supports a single power supply, and the 2E49-27R supports dual, redundant power supplies.
- The **2H252-25R** SmartSwitch, which provides 24 10/100 Ethernet ports via RJ45 connectors, as well as a **VHSIM** slot, which can accept any oHSIMs or the **VHSIM-G6** Gigabit Ethernet High Speed Interface Module.
- The **2E253-49R** SmartSwitch, which provides 48 Ethernet ports via 4 RJ21 Telco connectors, redundant internal power supplies, and a single VHSIM slot.
- The **2H22-08R** SmartSwitch, which has a total of eight ports consisting of six built-in front panel 10/100BaseTX RJ45 ports and two front panel slots for optional Fast Ethernet Port Interface Modules (FEPIMs) to support an uplink to 100 Mbps Ethernet backbones or a high speed connection to a local server. The 2H22-08R supports dual, redundant power supplies.

- The **2H28-08R** SmartSwitch, which has a total of eight ports consisting of six built-in front panel 100BaseFX multimode fiber SC ports and two front panel slots for optional Fast Ethernet Port Interface Modules (FEPIMs) to support an uplink to 100 Mbps Ethernet backbones or a high speed connection to a local server. The 2H28-08R supports dual, redundant power supplies.
- The **2H253-25R** SmartSwitch is a 10/100 Fast Ethernet switch, providing 24 100BaseTX ports via dual RJ21 connectors, and a VHSIM slot. The 2H253-25R also includes redundant internal power supplies.
- The **2H258-17R** SmartSwitch features 16 100BaseFX MMF (via MT-RJ connectors) ports, and a single VHSIM slot. The 2H258-17R also includes redundant internal power supplies.
- The **2M46-04R** SmartSwitch provides two front panel slots for optional Fast Ethernet Port Interface Modules (FEPIMs) to support an uplink to 100 Mbps Ethernet backbones or a high speed connection to a local server, and two slots for High Speed Interface Modules (HSIMs) which can provide FDDI, ATM, Gigabit Ethernet, or WAN connectivity depending on the type of HSIMs installed. The 2M46-04R supports dual, redundant power supplies.

Several Fast Ethernet Port Interface Modules (FEPIMs) are available for use with the various SmartSwitch 2000 models:

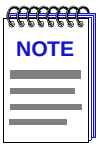
- the **FE-100FX**, which provides one multi-mode fiber port via an SC connector;
- the **FE-100TX**, with one Category 5 UTP RJ45 connector;
- the **FE-100F3**, with one single-mode fiber port via an SC connector;
- and the **FE-100S1**, **S3**, and **S5**, which provide one multi-mode fiber, single-mode fiber, or long reach single-mode fiber SONET/SDH port, all via SC connectors.

Two types of High Speed Interface Modules (HSIMs) are available for use with the various SmartSwitch 2000 models. Each HSIM provides frame translation between ATM, FDDI, WAN, Gigabit Ethernet, and Ethernet through an on-board Intel i960 processor:

- The **HSIM-F6** is an FDDI/Ethernet Translator, which can act as a Single Attached Station (SAS) or Dual Attached Station (DAS) on an external FDDI ring. FDDI Port Interface Modules (FPIMs) provide a wide range of media connectivity to the ring. The HSIM-F6 also has full-duplex capability, allowing for a 200 Mbps connection to another HSIM-F6.
- The **HSIM-A6DP** is an Asynchronous Transfer Mode (ATM) HSIM, which provides an ATM uplink via two media-configurable ATM Port Interface Modules (APIMs). The dual APIM design allows for a redundant connection to the uplink, so that if the primary interface fails, the secondary interface will automatically take over. The HSIM-A6DP acts as an ATM Forum LAN Emulation Client (LEC) so that it can transfer data between devices on an 802.X LAN supported by the SmartSwitch 2000 and ATM-connected end stations (or other 802.X end stations) across a high speed ATM Link. The HSIM-A6DP adheres to the ATM Forum-approved LAN Emulation (LANE)

standard, which defines how end users that rely on existing data communications technology and protocols can operate over an ATM network without penalty.

- The **HSIM-W6** and **HSIM-W84** are Wide Area Networking (WAN) HSIMs, which can provide uplinks to WAN backbones and allow you to perform seamless LAN to WAN switching. The **HSIM-W6** supports IP and IPX bridging or routing services, including IP RIP. Multiple WAN connectivity options are supported, including Sync, T1, E1, D&I, ISDN S/T, DDS, and HDSL interfaces, through the use of two configurable WAN Physical Interface Modules (WPIMs). Connectivity is available for Point to Point Protocol (PPP), as well as Frame Relay and Leased Lines. Each WPIM can act independently, allowing simultaneous communication, or configured to provide redundant channels if desired. The **HSIM-W84** provides a fixed configuration of four RJ45 ports for four active T1 interfaces.



The HSIM-W6 and HSIM-W84 are intelligent devices that are functionally identical to the CSX400. These HSIMs require their own IP addresses, and are managed as individual devices rather than as part of the device in which they are installed. Refer to the **CSX200 and CSX400 User's Guide** *for more information*

- The **HSIM-W87** is a Wide Area Network (WAN) HSIM that provides LAN to WAN connectivity for any SmartSwitch that supports high-speed interface modules (HSIMs). The HSIM-W87 has a DS3 interface (T3), providing up to 28 separate DS1 connections (T1). Refer to Chapter 8, **HSIM-W87 Configuration**, for information on configuring an HSIM-W87.
- The **HSIM-G01** and **HSIM-G09** are Gigabit Ethernet HSIMs, each of which provide a single Gigabit Ethernet connection that fully conforms to the IEEE P802.3z (D3.1) Draft Standard. The **HSIM-G01** provides a single 1000Base-SX (short-wave) multimode fiber optic SC interface, allowing for link distances of up to 500 meters. The **HSIM-G09** provides a single 1000Base-LX (long-wave) single mode / multimode fiber optic SC interface, allowing for link distances of up to 3 kilometers.
- The **HSIM-SSA710/20** are Wide Area Networking (WAN) HSIMs that support up to two ISDN PRI interfaces with up to 24 V.90 56K modem connections.

  The HSIM-SSA710/20 are intelligent devices that are managed as individual devices rather than as part of the device in which they are installed. Before you can access the device, you must add it to your central node database by inserting it in an existing List, Tree, or Map View, or by doing a Discover process (see the ***User's Guide*** for more information). Once it has been added to your List, Tree, or Map view, you can access and manage the HSIM according to the information in Chapter 2, **The SmartSwitch 2000 Chassis View**.

The latest SmartSwitches feature VHSIM slots, which can accept any of the previously detailed HSIMs or the **VHSIM-G6** Gigabit Ethernet High Speed Interface Module:

- The **VHSIM-G6** is a Gigabit Ethernet module which provides two slots for GPIMs of various media to offer integrated Gigabit Ethernet uplink capability. The VHSIM-G6 can accept the **GPIM-01**, which offers one SC connector for MMF 1000Base SX Gigabit Ethernet connectivity, the **GPIM-09**, which offers one SC connector for MMF or SMF 1000Base LX connectivity, or the **GPIM-04**, which offers one ANSI Fibrechannel style-2 connector for 150 Ohm STP 1000Base CX connectivity.

The various SmartSwitch 2000 devices will be collectively referred to as the SmartSwitch 2000 throughout this user's guide.

Using the SmartSwitch 2000 User's Guide

Each chapter in this guide describes one major functionality or a collection of several smaller functionalities of the SmartSwitch 2000 devices. This guide contains information about software functions which are accessed directly from the device icon.

Chapter 1, **Introduction**, provides a list of related documentation, describes certain software conventions, and shows you how to contact the Global Technical Assistance Center.

Chapter 2, **The SmartSwitch 2000 Chassis View**, describes the visual display of the SmartSwitch 2000 device and explains how to use the mouse within the Chassis View; the operation of device-level management functions — including Device Find Source Address, Port Redirect, Advanced Priority Configuration, pre-standard 802.1Q port-based VLAN configuration, enabling and disabling ports and setting device date and time — is also described here. This chapter also explains how to manage the device by monitoring its system resources, establishing device-level port priorities, setting up broadcast suppression on the device, and configuring the device's front panel COM port and any attached Uninterruptable Power Supply (UPS).

Chapter 3, **Alarm Configuration**, describes the Alarm and Event application windows and how to configure alarms and events for each available interface.

Chapter 4, **Statistics**, describes the statistics windows available on the port menu from the Chassis View.

Chapter 5, **Managing Ethernet MicroLAN Switches**, describes Ethernet repeater-specific functionality, which you can use to monitor and manage Ethernet MicroLAN Switches (e.g., the **2E43-51** and **2E43-51R**).

Chapter 6, **FDDI Applications**, describes the FDDI management windows available when you have an HSIM-F6 installed, including Configuration, Connection Policy, Station List, and Performance.

Chapter 7, **ATM Configuration**, describes how to configure Permanent Virtual Circuits (PVCs) for the ATM interface(s) in the ATM Connections window, which will be available if you have an HSIM-A6DP module installed in your device.

Chapter 8, **HSIM-W87 Configuration**, describes the T3, T1, and IP Priority configuration windows which will be available when an HSIM-W87 is installed.

Related Manuals

The ***SmartSwitch 2000 User's Guide*** is only part of a complete document set designed to provide comprehensive information about the features available to you through NetSight Element Manager. Other guides which include important information related to managing the SmartSwitch 2000 include:

User's Guide

Tools Guide

Remote Administration Tools User's Guide

Remote Monitoring (RMON) User's Guide

Alarm and Event Handling User's Guide

For more information about the capabilities of the SmartSwitch 2000, consult the appropriate hardware documentation.

Software Conventions

The NetSight Element Manager device user interface contains a number of elements which are common to most windows and which operate the same regardless of which window they appear in. A brief description of some of the most common elements appears below; note that the information provided here is not repeated in the descriptions of specific windows and / or functions.

Using the Mouse

This document assumes you are using a Windows-compatible mouse with two buttons; if you are using a three button mouse, you should ignore the operation of the middle button when following procedures in this document. Procedures within the NetSight Element Manager document set refer to these buttons as follows:

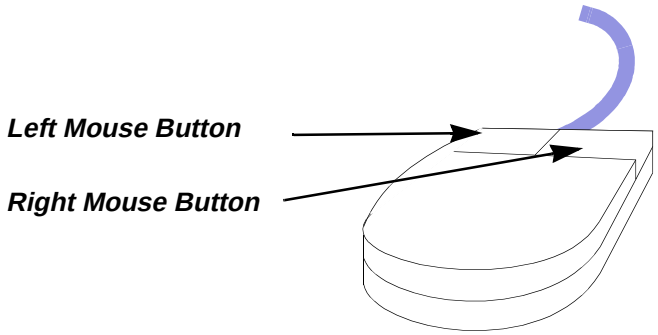


Figure 1-1. Mouse Buttons

For many mouse operations, this document assumes that the left (primary) mouse button is to be used, and references to activating a menu or button will not include instructions about which mouse button to use.

However, in instances in which right (secondary) mouse button functionality is available, instructions will explicitly refer to **right** mouse button usage. Also, in situations where you may be switching between mouse buttons in the same area or window, instructions may also explicitly refer to both **left** and **right** mouse buttons.

Instructions to perform a mouse operation include the following terms:

- **Pointing** means to position the mouse cursor over an area without pressing either mouse button.
- **Clicking** means to position the mouse pointer over the indicated target, then press and release the appropriate mouse button. This is most commonly used to select or activate objects, such as menus or buttons.
- **Double-clicking** means to position the mouse pointer over the indicated target, then press and release the mouse button two times in rapid succession. This is commonly used to activate an object's default operation, such as opening a window from an icon. Note that there is a distinction made between "click twice" and "double-click," since "click twice" implies a slower motion.
- **Pressing** means to position the mouse pointer over the indicated target, then press and hold the mouse button until the described action is completed. It is often a pre-cursor to Drag operations.
- **Dragging** means to move the mouse pointer across the screen while holding the mouse button down. It is often used for drag-and-drop operations to copy information from one window of the screen into another, and to highlight editable text.

Common SmartSwitch 2000 Window Fields

Similar descriptive information is displayed in boxes at the top of most device-specific windows in NetSight Element Manager, as illustrated in Figure 1-2, below.

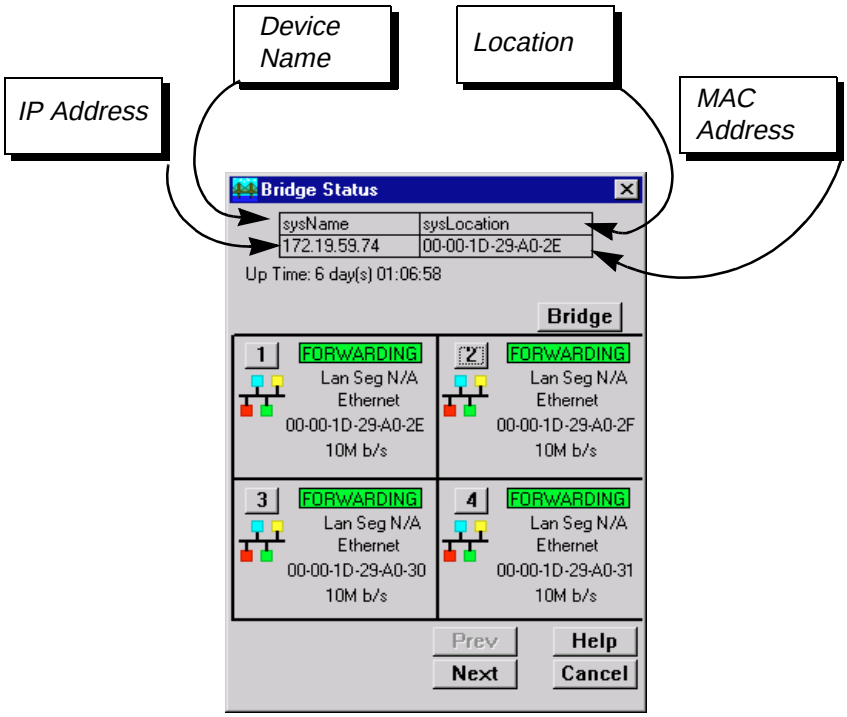


Figure 1-2. Sample Window Showing Group Boxes

Device Name

Displays the user-defined name of the device. The device name can be changed via the System Group window; see the ***Generic SNMP User's Guide*** for details.

IP Address

Displays the device's IP (Internet Protocol) Address; this will be the IP address used to define the device icon. IP addresses are assigned via Local Management for the SmartSwitch 2000; they cannot be changed via NetSight Element Manager.

Location

Displays the user-defined location of the device. The location is entered through the System Group window; see the ***Generic SNMP User's Guide*** for details.

MAC Address

Displays the manufacturer-set MAC address of the interface through which NetSight Element Manager is communicating. This address is factory-set and cannot be altered.

Informational fields describing the boards and / or ports being modeled are also displayed in most windows:

Board Number
Displays the number of the board. The SmartSwitch 2000 will always be Board 1.

Port Number
Displays the number of the monitored port.

Uptime
Displays the amount of time, in a X days hh:mm:ss format, that the SmartSwitch 2000 has been running since the last start-up.

Using Window Buttons

The **Cancel** button that appears at the bottom of most windows allows you to exit a window and terminate any unsaved changes you have made. You may also have to use this button to close a window after you have made any necessary changes and set them by clicking on an **OK**, **Set**, or **Apply** button.

An **OK**, **Set**, or **Apply** button appears in windows that have configurable values; it allows you to confirm and SET changes you have made to those values. In some windows, you may have to use this button to confirm each individual set; in other windows, you can set several values at once and confirm the sets with one click on the button.

The **Help** button brings up a Help text box with information specific to the current window. For more information concerning Help buttons, see **Getting Help**, on page 1-9.

The command buttons, for example **Bridge**, call up a menu listing the windows, screens, or commands available for that topic.

Any menu topic followed by ... (three dots) — for example **Statistics...** — calls up a window or screen associated with that topic.

Getting Help

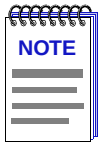
This section describes two different methods of getting help for questions or concerns you may have while using NetSight Element Manager.

Using On-line Help

You can use the SmartSwitch 2000 window **Help** buttons to obtain information specific to the device. When you click on a **Help** button, a window will appear which contains context-sensitive on-screen documentation that will assist you in

the use of the windows and their associated command and menu options. Note that if a Help button is grayed out, on-line help has not yet been implemented for the associated window.

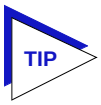
From the **Help** menu accessed from the Chassis View window menu bar, you can access on-line help specific to the Chassis View window, as well as bring up the Chassis Manager window for reference. Refer to Chapter 2 for information on the Chassis View and Chassis Manager windows.



All of the online help windows use the standard Microsoft Windows help facility. If you are unfamiliar with this feature of Windows, you can select ***Help*** *from the Windows* ***Start*** *menu, or* ***Help —>How to Use Help*** *from the primary NetSight Element Manager window.*

Accessing On-line Documentation

The complete suite of documents available for NetSight Element Manager can be accessed via a menu option from the primary window menu bar: **Help —> Online Documents.** If you chose to install the documentation when you installed NetSight Element Manager, selecting this option will launch Adobe's Acrobat Reader and a menu file which provides links to all other available documents.



If you have not yet installed the documentation, the ***Online Documents*** *option will not be accessible from the menu file. In order to activate this option, you must run the* ***setup.exe*** *again to install the documentation component. See the* **Installation Guide** *for details.*

Getting Help from the Global Technical Assistance Center

If you need technical support related to NetSight Element Manager, contact the Global Technical Assistance Center via one of the following methods:

By phone:	(603) 332-9400 *24 hours a day, 365 days a year*
By fax:	(603) 337-3075
By mail:	Enterasys Networks Technical Support 35 Industrial Way Rochester, NH 03867
By e-mail:	support@enterasys.com

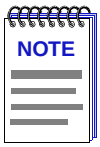
FTP:	ftp.ctron.com (134.141.197.25)
Login	`anonymous`
Password	`your e-mail address`
By BBS:	(603) 335-3358
Modem Setting	8N1: 8 data bits, 1 stop bit, No parity

Send your questions, comments, and suggestions regarding NetSight documentation to NetSight Technical Communications via the following address:

Netsight_docs@enterasys.com

To locate product specific information, refer to the Enterasys Web site:

http://www.enterasys.com



For the highest firmware versions successfully tested with NetSight Element Manager 2.21, refer to the ***Readme*** *file available from the NetSight Element Manager 2.2 program group. If you have an earlier version of firmware and experience problems running NetSight Element Manager, contact the Global Technical Assistance Center for upgrade information.*

Chapter 2

The SmartSwitch 2000 Chassis View

Information displayed in the Chassis View window; the Chassis Manager window; Hub management functions

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The SmartSwitch 2000 Chassis View window displays a color-coded graphic representation of your SmartSwitch 2000. It serves as a single point of access to all other SmartSwitch 2000 windows and screens, which are discussed at length in the following chapters.

To access the SmartSwitch 2000 Chassis View window, use one of the following options:

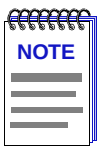
1. In any map, list, or tree view, double-click on the SmartSwitch 2000 you wish to manage;

   or

1. In any map, list, or tree view, select the SmartSwitch 2000 you wish to manage.
2. Select **Manage—>Node** from the primary window menu bar, or select the Manage Node  toolbar button.

   or

1. In any map, list, or tree view, click the **right** mouse button once to select the SmartSwitch 2000 you wish to manage and on the resulting menu, select **Manage**.



HSIMs that have their own IP address (HSIM-W6, HSIM-W84, and HSIM-SSA710/20) are accessed individually by selecting the HSIM you wish to manage and following the steps listed above. However, before you can access the device, you must add it to your central node database by inserting it in an existing List, Tree, or Map View, or by doing a Discover process (refer to the **User's Guide** *for more information). Once it has been added to your List, Tree, or Map view, you can access the HSIM from its individual icon.*

Viewing Chassis Information

The SmartSwitch 2000 Chassis View window (Figure 2-1) provides graphic representations of the SmartSwitch 2000, including a color-coded port display which immediately informs you of the current configuration and status of the switch and its ports.

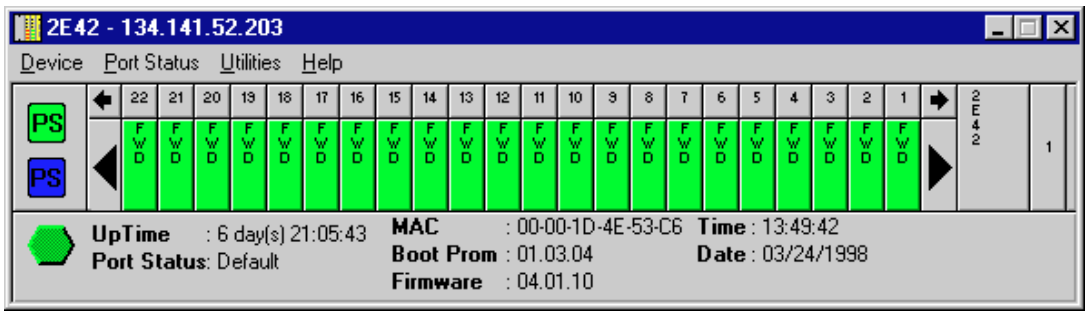


Figure 2-1. The SmartSwitch 2000 Chassis View Window

By clicking in designated areas of the chassis graphical display (as detailed later in this chapter), or by using the menu bar at the top of the Chassis View window, you can access all of the menus that lead to more detailed device-, module-, and port-level windows.

TIP

When you move the mouse cursor over a management "hot spot" the cursor icon will change into a "hand" to indicate that clicking in the current location will bring up a management option.

Front Panel Information

The areas surrounding the device display area provide the following device information:

IP

The Internet Protocol address assigned to the SmartSwitch 2000 appears in the title bar of the Chassis View window; this field will display the IP address you have used to create the SmartSwitch 2000 icon. IP addresses are assigned via Local Management.

Connection Status

This color-coded area indicates the current state of communication between NetSight Element Manager and the SmartSwitch 2000.

- **Green** indicates the SmartSwitch 2000 is responding to device polls (valid connection).

- **Magenta** indicates that the SmartSwitch 2000 is in a temporary stand-by mode while it responds to a physical change in the hub; note that board and port menus are inactive during this stand-by state.
- **Blue** indicates an unknown contact status – polling has not yet been established with the SmartSwitch 2000.
- **Red** indicates the SmartSwitch 2000 is not responding to device polls (device is off line, or device polling has failed across the network for some other reason).

UpTime
The amount of time, in a X days hh:mm:ss format, that the SmartSwitch 2000 has been running since the last start-up.

Port Status
If management for your device supports a variable port display (detailed in **Port Status Displays**, on page 2-10), this field will show the display currently in effect. If only a single port display is available — or if the default view is in effect — this field will state **Default**.

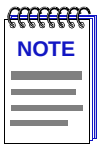
MAC
The physical layer address assigned to the interface through which NetSight Element Manager is communicating. MAC addresses are hard-coded in the device, and are not configurable.

Boot Prom
The revision of BOOT PROM installed in the SmartSwitch 2000.

Firmware
The revision of device firmware stored in the SmartSwitch 2000's FLASH PROMs.

Time
The current time, in a 24-hour hh:mm:ss format, set in the SmartSwitch 2000's internal clock.

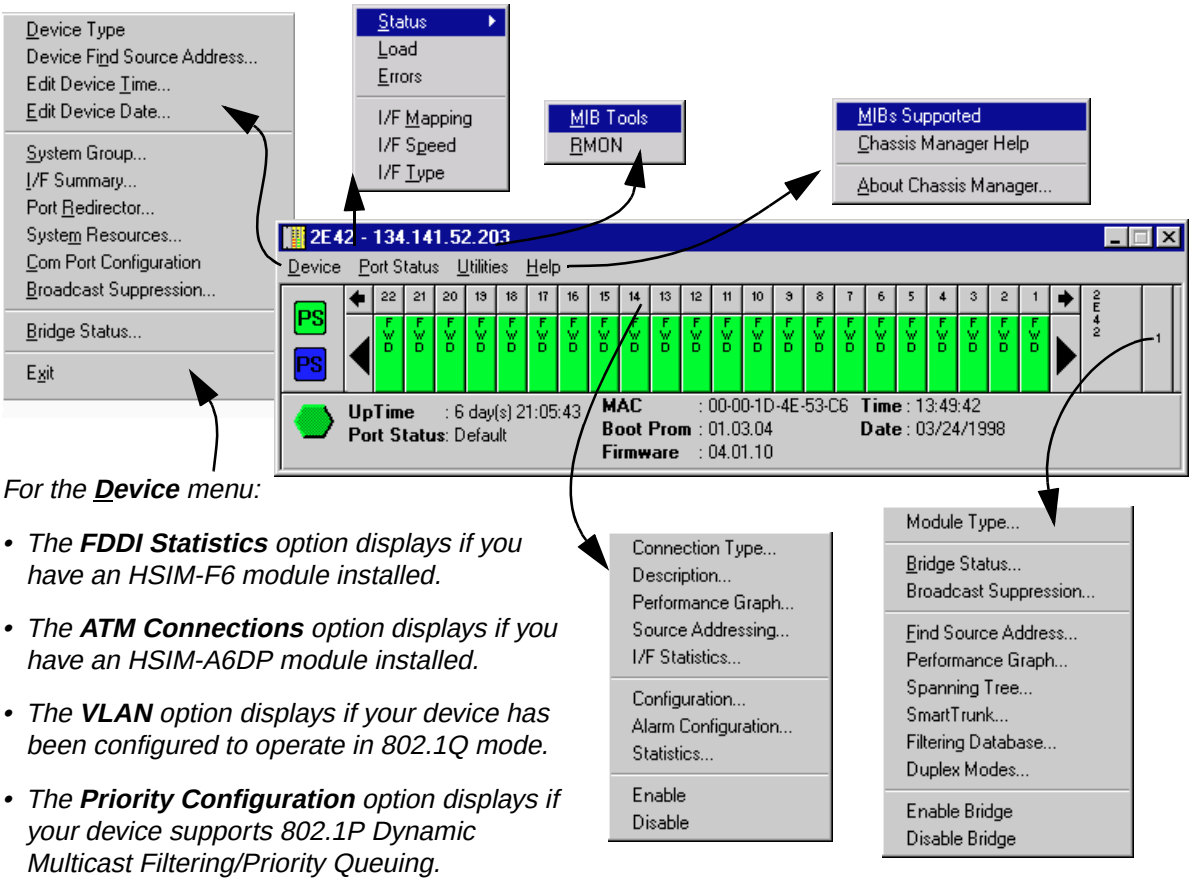
Date
The current date, in an mm / dd / yyyy format, set in the SmartSwitch 2000's internal clock.



*You can set the date and time by using the **Edit Device Date** and **Edit Device Time** options on the Device menu; see **Setting the Device Date and Time**, on page 2-70, for details. NetSight Element Manager displays and allows you to set all dates with four-digit year values.*

Menu Structure

By clicking on various areas of the SmartSwitch 2000 Chassis View display, you can access menus with device-, module-, and port-level options, as well as utility applications which apply to the device. The following illustration displays the menu structure and indicates how to use the mouse to access the various menus.



*For the **Device** menu:*

- *The **FDDI Statistics** option displays if you have an HSIM-F6 module installed.*
- *The **ATM Connections** option displays if you have an HSIM-A6DP module installed.*
- *The **VLAN** option displays if your device has been configured to operate in 802.1Q mode.*
- *The **Priority Configuration** option displays if your device supports 802.1P Dynamic Multicast Filtering/Priority Queuing.*
- *The **UPS** option will only appear if your COM port has been configured for use with an Uninterruptable Power Supply.*

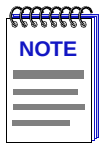
No bridge-related options display in any menu if the device is running in SecureFast Switching mode.

Figure 2-2. SmartSwitch 2000 Chassis View Menu Structure

The Device Menu

From the Device Menu at the Chassis View window menu bar, you can access the following selections:

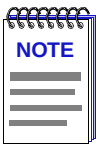
- **Device Type** displays a description of the device being modeled. See **Viewing Hardware Types**, on page 2-16.
- **Device Find Source Address** enables you to determine through which interface a specified MAC address is communicating by searching the 802.1d bridge Filtering database. Ethernet MicroLAN switches will also search the repeater Source Address Table (SAT). If the specified MAC address is located, a list of interface(s) through which the given address is communicating will be displayed.
- **Edit Device Time** and **Edit Device Date** allow you to set the SmartSwitch 2000's internal clock. See **Setting the Device Date and Time**, on page 2-70.
- **System Group** allows you to manage the SmartSwitch 2000 via SNMP MIB II. Refer to the ***Generic SNMP User's Guide*** for further information.
- **I/F Summary** lets you view statistics (displayed both graphically and numerically) for the traffic processed by each network interface on your SmartSwitch 2000. See **Viewing I/F Summary Information**, on page 2-18.
- **VLAN** menu option displays in the Device menu if your device is configured to operate in 802.1Q mode. The windows launched via the **VLAN** option allow you to configure and operate port-based VLANs on the device. See **802.1Q VLANs**, on page 2-56, for details.
- **Port Redirector** allows you to redirect traffic from one or more interfaces to another interface on your SmartSwitch 2000; see **Redirecting Traffic on the SmartSwitch 2000**, on page 2-44.
- **System Resources** displays current physical and logical system resources and utilizations on your SmartSwitch 2000; see **The System Resources Window**, on page 2-53.
- **Broadcast Suppression** allows you to monitor broadcast traffic statistics on each interface and set thresholds to limit broadcast traffic over your SmartSwitch 2000; see **Broadcast Suppression**, on page 2-67.
- **Priority Configuration** allows you to establish priority packet forwarding for the SmartSwitch 2000. See **Priority Configuration**, on page 2-46.



*The **Priority Configuration** menu option only displays for devices that respond to **any** of NetSight Element Manager's queries to the following OIDs: **ctPriorityExtPortStatus**, **ctPriorityExtMaxNumMACEntries**, or **ctPriorityExtNumPktTypeEntries**. If your device's firmware does not respond to these queries, contact the Global Technical Assistance Center for upgrade information.*

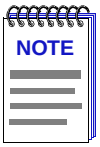
- **Com Port Configuration** allows you to administratively Enable or Disable and set the function of the COM Port; see **Configuring the COM Port**, page 2-39.

- **Broadcast Suppression** allows you to set a threshold on the number of broadcast packets issued from each port on the SmartSwitch 2000 when it is operating in traditional switch (bridge) mode. See **Broadcast Suppression**, on page 2-67.
- **FDDI Statistics** menu option displays if you have an HSIM-F6 installed in your device. This launches a window which displays traffic-related statistics for each Station Management (SMT) entity present on an installed HSIM-F6. See Chapter 6, **FDDI Applications**, for more information.
- **UPS**, which brings up a window that allows you to configure an Uninterruptable Power Supply attached to your SmartSwitch 2000; see **Using an Uninterruptable Power Supply (UPS)**, on page 2-41, for details.



*The **UPS** menu option will only be available when the COM Port is administratively set to UPS in the COM Port Configuration window.*

- **Bridge Status** opens a window that provides an overview of bridging information for each port, and allows you to access all other bridge-related options. Refer to the **Bridging** chapter in the ***Tools Guide*** for more information.
- **Exit** closes the SmartSwitch 2000 Chassis View window.



*If an HSIM-A6DP is installed in your SmartSwitch 2000, **ATM Connections** will be available as an additional Device menu selection. The ATM Connections window is described in Chapter 7, **ATM Configuration**.*

The Port Status Menu

The Port Status menu allows you to select the status information that will be displayed in the port text boxes in the Chassis View window:

- **Status** allows you to select one of four status type displays: Bridge, Bridge Mapping, Admin, or Operator.
- **Load** will display the portion of network load processed per polling interval by each interface, expressed as a percentage of its theoretical maximum load (10, 100, 155.5, or 1000 Mbps).
- **Errors** allows you to display the number of errors detected per polling interval by each interface, expressed as a percentage of the total number of valid packets processed by the interface.
- **I/F Mapping** will display the interface (if) index associated with each port on your SmartSwitch 2000 device.

- **I/F Speed** will display the port's bandwidth: 10M (megabits) for Ethernet; 100M for Fast Ethernet; 155.5M for ATM; and 1G for Gigabit Ethernet.
- **I/F Type** will display the port type of each port on your SmartSwitch 2000, e.g., Eth (ethernet-csmacd), ATM, or FDDI.
- **VLAN Mapping** displays if your device has been configured to operate in 802.1Q mode. It displays the VLAN ID number associated with each port on your SmartSwitch 2000.

For Ethernet MicroLAN Switches, the Port Status menu contains the following options:

- **Load** will display the portion of network load processed by each port as a percentage of the theoretical maximum load of the connected network segment (10, 100, 155.5, or 1000 Mbps).
- **Port Assignment** will display each port's repeater channel assignment (A-H).
- **Status** allows you to select one of three status type displays: Admin/Link, Admin, or Link.
- **Errors**, and **Frame Size** allow you to display the percentage per port of the specific Error or Frame Size you select.

For more information on the port display options available via this menu, see **Port Status Displays**, on page 2-10.

The Repeater Menu

If you are modeling an Ethernet MicroLAN Switch, the Repeater menu displays, offering the following options for each repeater segment (A-H) on the device:

- **Statistics**
- **Timer Statistics**
- **Performance Graph**
- **Alarm Limits**
- **Trap Selection**

Refer to Chapter 5, **Managing Ethernet MicroLAN Switches**, for information on these menu selections.

The FDDI Menu

If your SmartSwitch 2000 has an installed HSIM-F6, the FDDI menu displays on the Chassis View menu bar, with the following options:

- **Configuration**
- **Connection Policy**
- **Station List**
- **Performance**
- **Frame Translation**

Refer to Chapter 6, **FDDI Applications**, for information on these menu selections.

The Utilities Menu

The Utilities menu provides access to the MIB Tools utility, which provides direct access to the SmartSwitch 2000's MIB information, and to the RMON utility, a remote monitoring feature that is supported by many intelligent devices. These selections are also available from the **Utilities** menu at the top of NetSight Element Manager's primary window. Refer to the ***Tools Guide*** for a thorough explanation of the MIB Tools and RMON utilities.

The Help Menu

The Help Menu has three selections:

- **Mibs Supported** brings up the Chassis Manager window, described in **The Chassis Manager Window**, on page 2-15.
- **Chassis Manager Help** brings up a help window with information specifically related to using the Chassis Manager and Chassis View windows.
- **About Chassis Manager** brings up a version window for the Chassis Manager application in use.

The Module Menu

The Module menu for the SmartSwitch 2000 device provides mostly bridging-related selections, many of which are also available from the Bridge Status window:

- **Module Type** brings up a window containing a description of the selected board; see **Viewing Hardware Types**, on page 2-16.
- **Bridge Status** opens a window that provides an overview of bridging information for each port, and allows you to access all other bridge-related options. Refer to the **Bridging** chapter in the ***Tools Guide*** for more information.
- **Broadcast Suppression** allows you to set a threshold on the number of broadcast packets issued from each port on the SmartSwitch 2000 device when it is operating in traditional switch (bridge) mode. See **Broadcast Suppression**, on page 2-67.
- **Frame Translation** displays in the Module menu if your SmartSwitch 2000 has an installed HSIM-F6. Refer to Chapter 6, **FDDI Applications**, for information on this menu selection.
- **Device Find Source Address** enables you to determine through which interface a specified MAC address is communicating by searching the 802.1d bridge Filtering database. Ethernet MicroLAN switches will also search the repeater Source Address Table (SAT). If the specified MAC address is located, a list of interface(s) through which the given address is communicating will be displayed.
- **Performance Graph** displays performance between all bridging ports on the SmartSwitch 2000; see the **Bridging** chapter in the ***Tools Guide*** for more information.

- **Spanning Tree** allows you to set bridge parameters when it is operating using the Spanning Tree Algorithm (STA) – the method that bridges use to decide the controlling (root) bridge when two or more bridges are in parallel; see the **Bridging** chapter in the ***Tools Guide*** for more information.
- **SmartTrunk** invokes the SmartTrunk Configuration and Status Screen, which enables you to group interfaces logically to achieve greater bandwidth between devices, if both devices support the SmartTrunk feature. There is no limit to the number of ports that can be included in a single "trunk," nor is there a limit to the number of trunked "instances" that can be supported. Refer to the **Bridging** chapter in the ***Tools Guide*** for more information.
- **Filtering Database** allows you to monitor and manage bridge forwarding and filtering across each port of the SmartSwitch 2000; see the **Bridging** chapter in the ***Tools Guide*** for more information.
- **Duplex Modes** allows you to set Duplex Mode operation for standard Ethernet interfaces on your SmartSwitch 2000; see the **Bridging** chapter in the ***Tools Guide*** for more information.
- **Enable Bridge** enables bridging across the entire SmartSwitch 2000.
- **Disable Bridge** disables bridging across the entire SmartSwitch 2000.

The Port Menus

The menu for bridging ports offers the following selections:

- **Connection Type** displays a text description of the connection type of the selected interface. This menu option appears if the device supports the ***ctIfConnectionType*** OID. See **Viewing Hardware Types**, on page 2-16, for details.
- **Description** displays a text description of the selected port. See **Viewing Hardware Types**, on page 2-16, for details.
- **Performance Graph** brings up windows that visually display bridging performance at the selected port; see the **Bridging** chapter in the ***Tools Guide*** for more information.
- **Source Addressing** brings up a window that displays the contents of the SmartSwitch 2000's Filtering Database with respect to a selected port. This will display the source MAC addresses that have been detected by the port as it forwards data across the network; see the **Bridging** chapter in the ***Tools Guide*** for more information.
- **I/F Statistics** launches a Statistics window, which displays interface statistics for the port; see the **Bridging** chapter in the ***Tools Guide*** for more information.
- **Configuration** launches the configuration window appropriate to the selected port: for standard Ethernet and FDDI ports, the configuration window allows you to set the Duplex Mode; for Fast Ethernet and Gigabit Ethernet ports it allows you to configure a number of different options, including auto-negotiation. See **Configuring Ports**, on page 2-27 for details.

- **Alarm Configuration** brings up windows that allow you to configure alarms and events for each available interface; see Chapter 3, **Alarm Configuration** for details.
- **Statistics** launches the highest level of statistics currently available for the selected port. For standard Ethernet and Fast Ethernet ports, RMON statistics will be displayed if the RMON Default MIB component is active; if it has been disabled, MIB-II interface statistics will display. See Chapter 4, **Statistics** for more information.
- **Enable/Disable** administratively turns the selected port on or off; see **Enabling and Disabling Ports**, on page 2-71, or the **Bridging** chapter in the ***Tools Guide*** for more information.

Port Status Displays

When you open the Chassis View window, each port will display its Bridging state (defined below) by default, with the exception of Ethernet MicroLAN Switches, which will display their Admin/Link status (also defined below) by default; to change this status display, select one of the options on the Port Status menu, as described in the following sections.

Selecting a Port Status View

To change the status view of your ports:

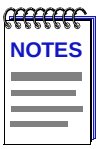
1. Click on **Port Status** on the menu bar at the top of the Chassis View window, and drag down (and to the right, if necessary) to select the status information you want to display. The port text boxes will display the appropriate status information.

Port status view options are:

Status

You can view four port status categories, as follows:

- **Bridge** — FWD, DIS, LRN, LIS, BLK, BRK, UNK
- **Bridge Mapping** — the physical interface associated with a bridge port
- **Admin** — ON or OFF
- **Operator** — ON or OFF



The Bridge and Bridge Mapping status modes will not be supported for devices which have been configured for SecureFast switching. Firmware versions 2.01.05 and above support the ability to select SecureFast switching; if you have a earlier version of firmware, contact the Global Technical Assistance Center for upgrade information. The toggle from traditional bridging to SecureFast switching is performed via Local Management; see your Local Management documentation for details.

If you have selected the **Bridge** status mode, a port is considered:

- FWD (Forwarding) if the port is on-line and forwarding packets across the SmartSwitch 2000 from one network segment to another.
- DIS (Disabled) if bridging at the port has been disabled by management; no traffic can be received or forwarded on this port, including configuration information for the bridged topology.
- LRN (Learning) if the Forwarding database is being created, or the Spanning Tree Algorithm is being executed because of a network topology change. The port is monitoring network traffic, and learning network addresses.
- LIS (Listening) if the port is not adding information to the filtering database. It is monitoring Bridge Protocol Data Unit (BPDU) traffic while preparing to move to the forwarding state.
- BLK (Blocking) if the port is on-line, but filtering traffic from going across the SmartSwitch 2000 from one network segment to another. Bridge topology information will be forwarded by the port.
- UNK (Unknown) if the interface's status cannot be determined.

If you have selected the **Bridge Mapping** status mode, the port display will alter to show the physical interface index (*ifIndex*) associated with each front panel bridge port. For the SmartSwitch 2000 devices, the front panel bridge interfaces will map directly to each interface's *ifIndex*.

If you have selected the **Admin** status mode, a port is considered:

- ON if the port is enabled by management and has a valid link.
- OFF if it has not been enabled or if it has been disabled through management action.

If you have selected the **Operator** status mode, a port is considered:

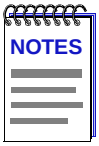
- ON if the port is currently forwarding packets.
- OFF if the port is not currently forwarding packets.

Load

If you choose **Load**, the interface text boxes will display the percentage of network load processed by each port during the last polling interval. This percentage reflects the network load generated per polling interval by devices connected to the port compared to the theoretical maximum load (10, 100, 155.5, or 1000 Mbps) of the connected network.

Errors

If you choose the **Errors** mode, the interface boxes will display the percentage of the total number of valid packets processed by each port during the last polling interval that were error packets. This percentage reflects the number of errors generated during the last polling interval by devices connected to that port compared to the total number of valid packets processed by the port.



In NetSight Element Manager, the polling interval is set using the Options window, accessed via the ***Tools—>Options*** *option from the primary window's menu bar. Refer to the* **User's Guide** *for information on setting device polling intervals.*

I/F Mapping

If you choose the **I/F Mapping** mode, the interface boxes will display the interface number (*ifIndex*) associated with each port in the SmartSwitch 2000.

I/F Speed

If you choose the **I/F Speed** mode, the interface boxes will display the bandwidth of each individual port on the SmartSwitch 2000: 10M (megabits) for standard Ethernet; 100M for Fast Ethernet, 155.5 M for ATM; and 1.00 G for Gigabit Ethernet.

I/F Type

If you choose the **I/F Type** mode, the interface boxes will display the interface type of each port on the SmartSwitch 2000, e.g., Eth (ethernet-csmacd), ATM, or FDDI. Note that there is no type distinction between standard Ethernet, Fast Ethernet, and Gigabit Ethernet.

Port status view options for an Ethernet MicroLAN Switch are:

Load

If you choose **Load**, the port text boxes will display the percentage of network load processed by each port during the last polling interval. This percentage reflects the network load generated by devices connected to the port compared to the theoretical maximum load (10, 100, 155.5, or 1000 Mbps) of the connected network.

Status

You can view three status categories for your ports which reflect six possible Admin/Link, Admin, or Link **Status** conditions:

- **Admin/Link** — ON, OFF, SEG (segmented), or NLK (not linked)
- **Admin** — ON or OFF
- **Link** — LNK (link), NLK (not linked), or N/A (not available)

If you have selected the **Admin/Link** status mode, a port is considered:

- ON if the port is enabled and has a valid link.
- OFF if it has not been enabled or if it has been disabled through management action.
- SEG (segmented) if the port has been enabled by management and has a valid connection, but has been segmented by the repeater because 33 consecutive collisions have occurred on the attached segment, or the collision detector was on for more than 2.4 µs.
- NLK (Not Linked) when the port is on, but there is no physical link to the port. This field is a combination of two status conditions: No Link and Port Administrative Status On.

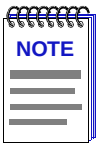
If you have selected the **Admin** status mode, a port is considered:

- ON if the port is enabled.
- OFF if the port has been disabled by management.

These conditions do not reflect *link* status.

If you have selected the **Link** status mode, a port is considered:

- LNK (Linked) when a valid link has been established between the port and the device at the other end of the segment.
- NLK (Not Linked) when the port is on, but there is no physical link to the port or the device at the other end of the port's segment is down.
- N / A (not available) when NetSight Element Manager cannot determine the link status for the port.



Because BNC thin coax and AUI ports do not support the link feature, the displayed Admin/Link, Admin, and Link status conditions will not always follow the pattern described above:

*Under **Admin/Link** status mode, BNC ports will display as ON if there is a valid connection and the port has been enabled; OFF if the port has been disabled; and SEG if the port has experienced 33 consecutive collisions or if there is no cable attached. An AUI port will display as ON if the port has been enabled (regardless of whether or not there is a valid connection), OFF if the port has been disabled, and SEG if the port has detected 33 consecutive collisions. Note that the Admin/Link status displays for BNC and AUI ports can be misleading in terms of troubleshooting; be sure to keep in mind that a BNC port displaying as segmented may only have had its cable disconnected, and an AUI port that appears to be on and linked may not have any cable attached.*

*Under **Admin** status mode, AUI and BNC ports will display as ON if the port has been enabled, and OFF if it has been disabled; as with other port types, these ON and OFF conditions indicate nothing about link status.*

*Under **Link** status mode, AUI and BNC port display boxes will display N/A, indicating that NetSight Element Manager is unable to determine their link status.*

Port Assignment

If you choose **Port Assignment**, each port's status box will display a letter which designates its current repeater channel assignment (A-H).

Errors or Frame Size

If you choose the **Errors** or **Frame Size** modes, additional menus offer the following options for each mode:

Errors	Total Errors, Collisions, Alignment, CRC, Runts, Giants, or OOW Collisions
Frame Size	Runts, 64-127, 128-255, 256-511, 512-1023, 1024-1518, or Giants

The port status boxes will display the percentage for each active port that represents what portion of that port's total traffic is of the specific type (**Errors** or **Frame Sizes**) that you selected.

Select one of the **Errors** options to see what percentage of the total packets received by each active port during the last polling interval was of the error type you selected. This percentage reflects the number of errors generated by devices connected to that port in relation to the total number of packets processed by the port (errors ÷ [errors + packets]).

Choose the **Frame Size** option to check on the sizes, in bytes, of frames passing through your ports. The percentages are calculated just like the Errors selection described above: the number given represents the number of packets of the selected size generated by devices connected to that port in relation to the total number of packets processed. Remember, these percentages are calculated based on the numbers of packets processed during one polling cycle.

Port Status Color Codes

The Port Status display options —Bridge, Admin, and Operator— incorporate color coding schemes. For the Admin and Operator **Status** display options, green = ON, red = OFF, and blue = N/A (not available). For the Bridge **Status** display option, green = forwarding, blue = disabled, magenta = learning and listening, orange = blocking, red = broken, and gray = unknown.

For all other Port Status selections — Load, Errors, Bridge Mapping, I/F Mapping, I/F Speed, and I/F Type— color codes will continue to reflect the most recently selected mode which incorporates its own color coding scheme.

For an Ethernet MicroLAN Switch, three of the port status display options — Port Assignment, Port Type, and Status — incorporate their own color coding schemes. For any of the **Status** display options — Admin/Link, Admin, or Link — green = ON/LNK, yellow = SEG/NLK, red = OFF, and blue = N/A (not available). For the **Port Assignment** display option, Channel A = magenta, Channel B = olive, Channel C = cyan, Channel D = yellow, Channel E = orange, Channel F = white, Channel G = green, Channel H = hot pink. For the **Port Type** display option, station ports will display as yellow; trunk ports will display as green.

For all other Ethernet MicroLAN Switch Port Status selections — Load, Errors, and Frame Size — color codes will continue to reflect the most recently selected mode which incorporates its own color coding scheme.

The Chassis Manager Window

The SmartSwitch 2000 draws its functionality from a collection of proprietary MIBs and IETF RFCs, and organizes that MIB data into a series of “components.” A MIB component is a logical grouping of MIB data, and each group controls a defined set of objects. For example, SmartSwitch 2000 bridging information is organized into its own component; more generic device and port information resides in the chassis component. There is no one-to-one correspondence between MIBs and MIB components; a single MIB component might contain objects from several different proprietary MIBs and RFCs.

The Chassis Manager window, Figure 2-3, is a read-only window that displays the MIBs and the MIB components — and, therefore, the functionality — supported by the currently monitored device.

1. Select on **Help-->Mibs Supported** on the menu bar at the top of the Chassis View window.

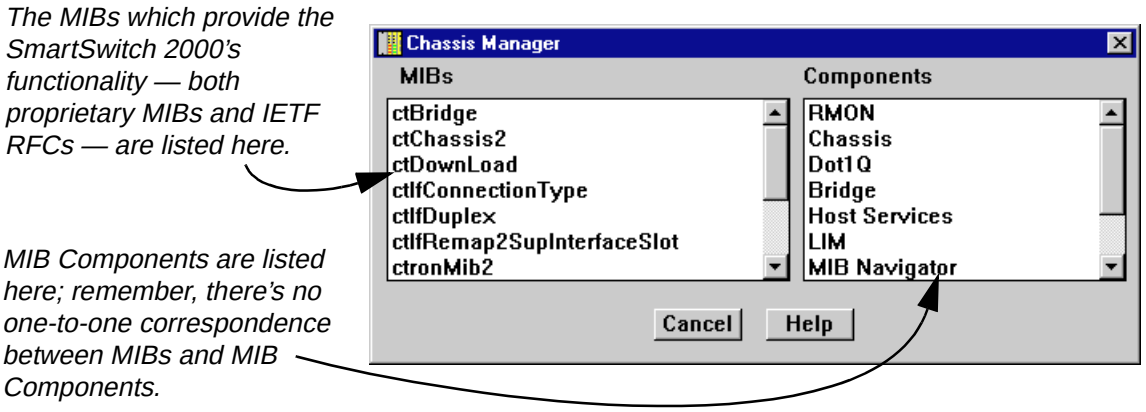


Figure 2-3. The Chassis Manager Window

Viewing Hardware Types

In addition to the graphical displays described above, menu options available at the device and module levels provide specific information about the physical characteristics of the SmartSwitch 2000.

Device Type

Choosing the **Device Type** option from the Device menu brings up a window that describes the management device being modeled:

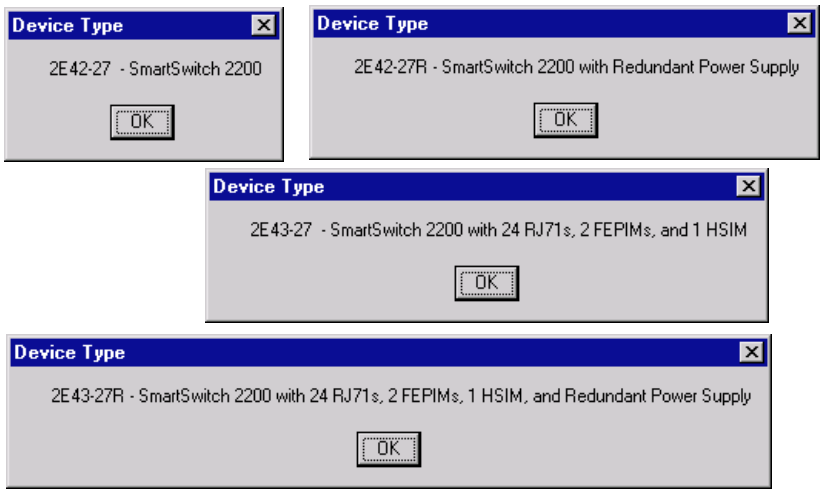


Figure 2-4. Sample Device Type Windows

Module Type

From the Module menu on the SmartSwitch 2000 Chassis View window, you can view a description of the SmartSwitch 2000.

1. Click on the SmartSwitch 2000 module index. The Module Menu opens.
2. Select **Module Type**. A Module Type text box opens, describing the SmartSwitch 2000.

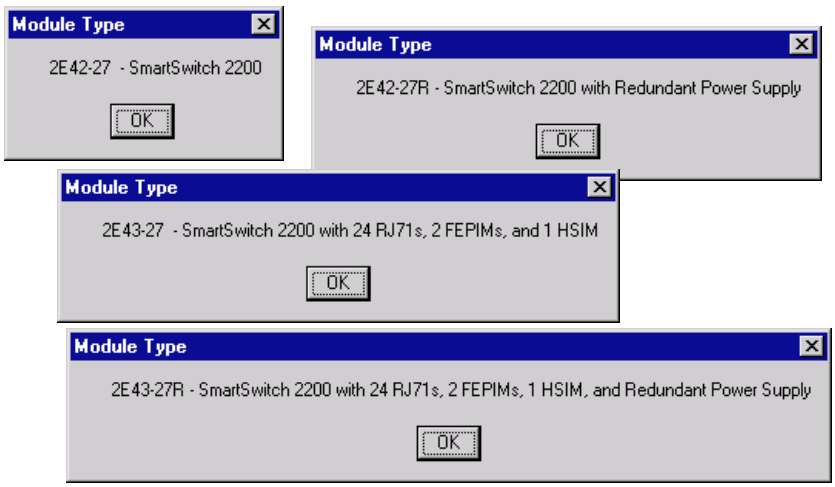


Figure 2-5. Sample Module Type Windows

Connection Type

If your SmartSwitch 2000 supports the ***ctIfConnectionType*** OID, its Port menus will contain the **Connection Type** option. Selecting this option will display a window that describes the selected interface's connection type.

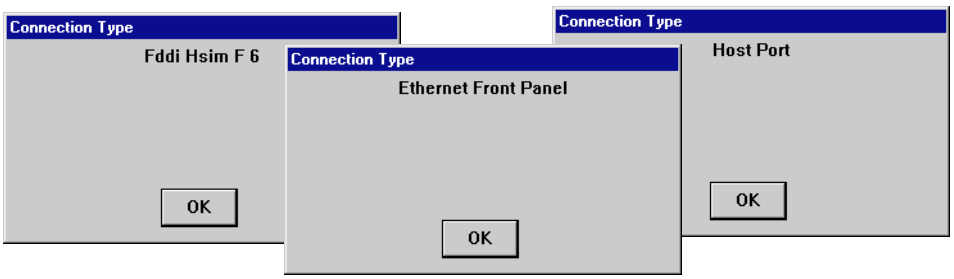


Figure 2-6. Sample Connection Type Windows

Interface Description

Choosing the **Description** option from the Port menu brings up a window that describes the selected interface.

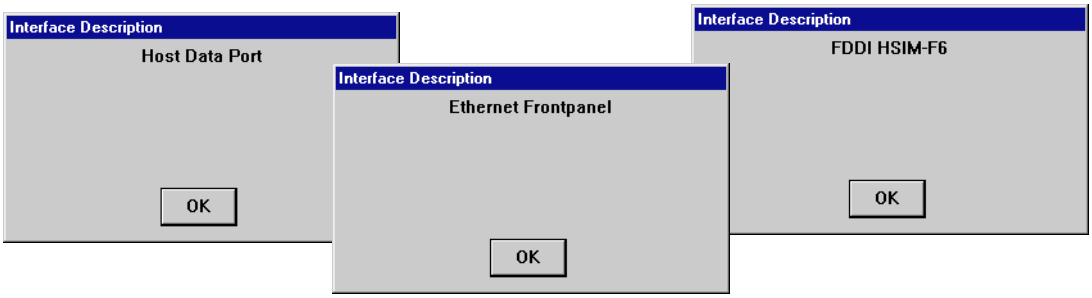


Figure 2-7. Sample Interface Description Windows

Viewing I/F Summary Information

The **I/F Summary** menu option available from the Device menu lets you view statistics for the traffic processed by each network interface on your device. The window also provides access to a detailed statistics window that breaks down Transmit and Receive traffic for each interface.

To access the I/F Summary window:

1. From the Chassis View, click on the **Device** option from the menu bar.
2. Click again to select **I/F Summary**. The I/F Summary window, Figure 2-8, opens.

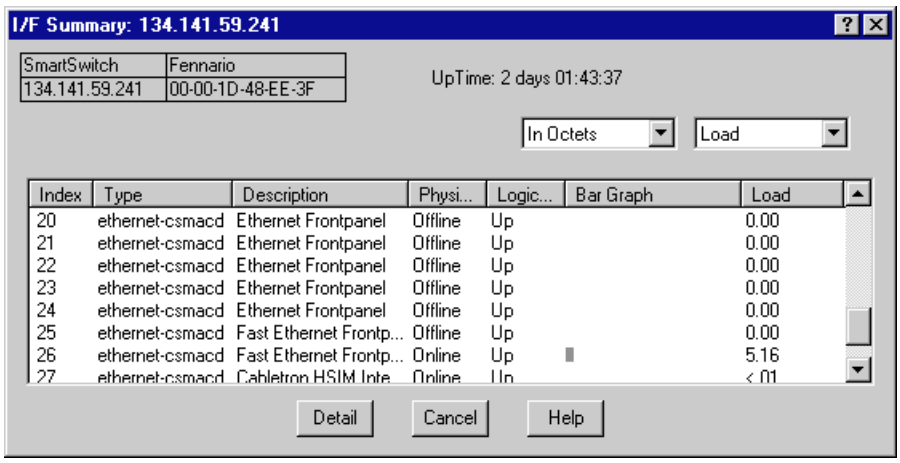


Figure 2-8. The I/F Summary Window

The I/F Summary window provides a variety of descriptive information about each interface on your device, as well as statistics which display each interface's performance.

The following descriptive information is provided for each interface:

UpTime
The **UpTime** field lists the amount of time, in a days, hh:mm:ss format, that the device has been running since the last start-up.

Index
The index value assigned to each interface on the device.

Type
The type of the interface, distinguished by the physical/link protocol(s) running immediately below the network layer.

Description
A text description of the interface.

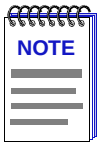
Physical Status
Displays the current physical status — or operational state — of the interface: **Online** or **Offline**.

Logical Status
Displays the current logical status — or administrative state — of the interface: **Up** or **Down**.

Interface Performance Statistics/Bar Graphs

The statistical values (and, where available, the accompanying bar graphs) to the right of the interface description fields provide a quick summary of interface performance. You can select the statistical value you want to display and the units in which you want those values displayed by using the two menu fields directly above the interface display area, as follows:

1. In the right-most menu field, click on the down arrow and select the unit in which you wish to display the selected statistic: **Load**, **Raw Counts**, or **Rate**.



*Bar graphs are only available when **Load** is the selected base unit; if you select **Raw Counts** or **Rate**, the Bar Graph column will be removed from the interface display.*

2. Once you have selected the base unit, click on the down arrow in the left-most field to specify the statistic you'd like to display. The options available from this menu will vary depending on the base unit you have selected.

After you select a new display mode, the statistics (and graphs, where applicable) will refresh to reflect the current choice, as described below.

Raw Counts

The total count of network traffic received or transmitted on the indicated interface since device counters were last reset. Raw counts are provided for the following parameters:

In Octets	Octets received on the interface, including framing characters.
In Packets	Packets (both unicast and non-unicast) received by the device interface and delivered to a higher-layer protocol.
In Discards	Packets received by the device interface that were discarded even though no errors prevented them from being delivered to a higher layer protocol (e.g., to free up buffer space in the device).
In Errors	Packets received by the device interface that contained errors that prevented them from being delivered to a higher-layer protocol.
In Unknown	Packets received by the device interface that were discarded because of an unknown or unsupported protocol.
Out Octets	Octets transmitted by the interface, including framing characters.
Out Packets	Packets transmitted, at the request of a higher level protocol, by the device interface to a subnetwork address (both unicast and non-unicast).
Out Discards	Outbound packets that were discarded by the device interface even though no errors were detected that would prevent them from being transmitted. A possible reason for discard would be to free up buffer space in the device.
Out Errors	Outbound packets that could not be transmitted by the device interface because they contained errors.

Load

The number of bytes processed by the indicated interface during the last poll interval in comparison to the theoretical maximum load for that interface type. Load is further defined by the following parameters:

In Octets	The number of bytes received by this interface, expressed as a percentage of the theoretical maximum load.

Out Octets	The number of bytes transmitted by this interface, expressed as a percentage of the theoretical maximum load.

When you select this option, a Bar Graph field will be added to the interface display area; this field is only available when **Load** is the selected base unit.

Rate

The count for the selected statistic during the last poll interval. The available parameters are the same as those provided for Raw Counts. Refer to the Raw Counts section, above, for a complete description of each parameter.

Viewing Interface Detail

The Interface Statistics window (Figure 2-9) provides detailed MIB-II interface statistical information — including counts for both transmit and receive packets, and error and buffering information — for each individual port interface. Color-coded pie charts also let you graphically view statistics for both received and transmitted Unicast, Multicast, Discarded, and Error packets.

To open the Interface Statistics window:

1. In the I/F Summary window, select the interface for which you'd like to view more detailed statistics.
2. Click on **Detail**. The appropriate I/F Statistics window, Figure 2-9, opens.

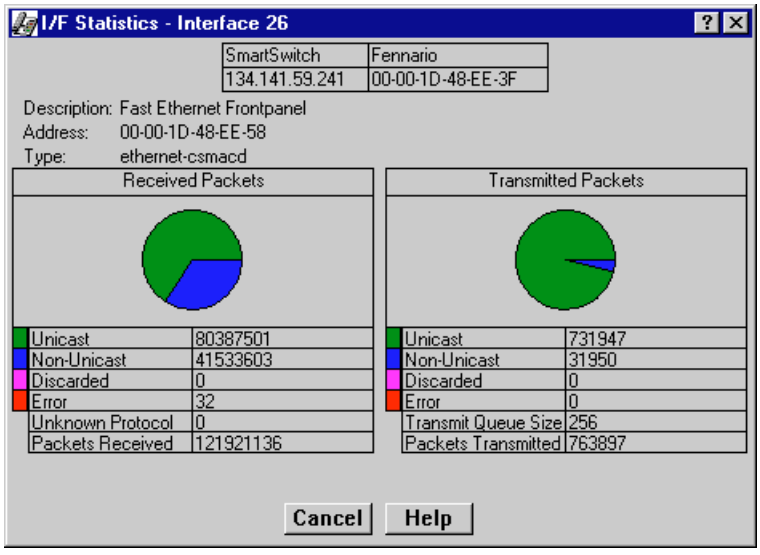


Figure 2-9. Detail Interface Statistics

*You can also access this information via the **I/F Statistics** option available on the individual port menus; see Chapter 4, **Statistics**, for more information.*

Three informational fields appear in the upper portion of the window:

Description
Displays the interface description for the currently selected interface.

Address
Displays the MAC (physical) address of the selected interface.

Type
Displays the interface type of the selected port.

The lower portion of the window provides the following transmit and receive statistics. The first four statistics are also displayed in pie charts.

Unicast
Displays the number of packets transmitted to or received from this interface that had a single, unique destination address. These statistics are displayed in the pie chart, color-coded green.

Non-Unicast
Displays the number of packets transmitted to or received from this interface that had a destination address that is recognized by more than one device on the network segment. The multicast field includes a count of broadcast packets — those that are recognized by *all* devices on a segment. These statistics are displayed in the pie chart, color-coded dark blue.

Discarded
Displays the number of packets which were discarded even though they contained no errors that would prevent transmission. Good packets are typically discarded to free up buffer space when the network becomes very busy; if this is occurring routinely, it usually means that network traffic is overwhelming the device. To solve this problem, you may need to re-configure your bridging parameters, or perhaps re-configure your network to add additional bridges or switches.

These statistics are displayed in the pie chart, color-coded magenta.

Error
Displays the number of packets received or transmitted that contained errors. These statistics are displayed in the pie chart, color-coded red.

Unknown Protocol *(Received only)*
Displays the number of packets received which were discarded because they were created under an unknown or unsupported protocol.

Packets Received *(Received only)*
Displays the number of packets received by the selected interface.

Transmit Queue Size *(Transmit only)*
Displays the number of packets currently queued for transmission from this interface. The amount of device memory devoted to buffer space, and the traffic level on the target network, determine how large the output packet queue can grow before the SmartSwitch 2000 device will begin to discard packets.

Packets Transmitted *(Transmit only)*
Displays the number of packets transmitted by this interface.

Making Sense of Detail Statistics

The statistics available in this window can give you an idea of how an interface is performing; by using the statistics in a few simple calculations, it's also possible to get a sense of an interface's activity level:

To calculate the percentage of input errors:

`Received Errors /Packets Received`

To calculate the percentage of output errors:

`Transmitted Errors /Packets Transmitted`

To calculate the total number of inbound and outbound discards:

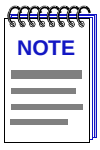
`Received Discards + Transmitted Discards`

To calculate the percentage of inbound packets that were discarded:

`Received Discards /Packets Received`

To calculate the percentage of outbound packets that were discarded:

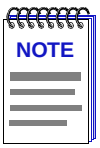
`Transmit Discards /Packets Transmitted`



The Interface Statistics window does not offer ***Disable*** *or* ***Test*** *options. These options are available in the Interface Group window, which can be accessed via the System Group window (select* ***System Group*** *from the* ***Device*** *menu). See to the* **Generic SNMP User's Guide** *for information on the System Group and Interface Group windows.*

Using Device Find Source Address

When you select the **Device Find Source Address** option, the device's 802.1d Filtering database is searched for the specified MAC address. If it is found, the **Component** field will display the value "Bridge" indicating that the address was found on a bridging interface, and the **Port Instance** field will display the index number assigned to the bridge port on which the address was located.



You may receive an error message stating "Can't Display Source Address" if a Port Instance of "0" or "0.0" is reported. This value indicates that the MAC address is communicating through the backplane instead of through a front panel interface.

To open the Device Find Source Address window:

1. Click on **Device** in the Chassis View menu bar.
2. Click on **Device Find Source Address**. The Device Find Source Address window, as shown in Figure 2-10, opens.

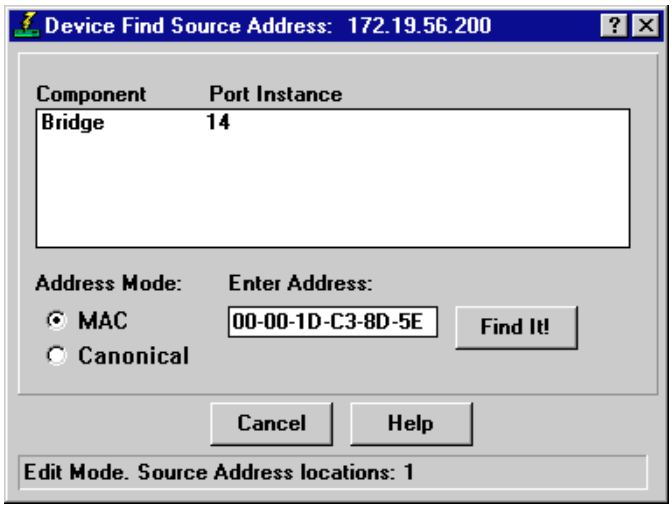


Figure 2-10. Device Find Source Address Window

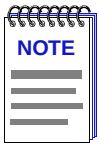
The Device Find Source Address window displays the following information:

Component
Displays the type of interface through which the specified MAC address is communicating. This field will report **Bridge**.

Port Instance
Displays the bridge port index number on which the specified MAC address was found.

To use the Device Find Source Address window:

1. In the **Address Mode** field, select the format of the Source Address you wish to find, either **MAC** or **Canonical**.
2. In the **Enter Address** text box, enter the Source Address you wish to find in the appropriate XX-XX-XX-XX-XX-XX format.

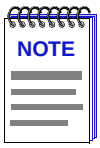


*If you enter the MAC format of a specified address, and then click on **Canonical**, NetSight Element Manager will do the address conversion for you, from the Ethernet hexadecimal format to the Token Ring Canonical format. The same is also true if you enter the Canonical format of a specified address and then select **MAC**.*

3. Click on the **Find It!** button. A "**Processing Request**" message opens in the status bar at the bottom of the window.

If the specified MAC address is located, a list of the interface(s) through which the given address is communicating displays in the list box. A status message at the bottom of the window will display the number of interfaces through which the given MAC address is communicating.

If the specified MAC address cannot be found, a "**Source Address not found**" message displays.



*If the MAC address is entered in an incorrect format, an "**Invalid MAC Address. Enter Valid MAC Address**" message displays. Enter the address in the correct XX-XX-XX-XX-XX-XX hexadecimal format.*

Using Device Find Source Address on Ethernet MicroLAN Switches

When you select the **Device Find Source Address** option on an Ethernet MicroLAN Switch, a search is made of both the Source Address Table (SAT) and the 802.1d Filtering database to discover through which interface(s) a specified source MAC address is communicating. If the MAC address is found, the interface types "Bridge" and "Enet #" will display in the **Component** field with their associated port index number displayed in the **Port Instance** field.

NOTE

You may receive an error message stating "Can't Display Source Address" if a Port Instance of "0" or "0.0" is reported while using the Device Find Source Address feature. This value indicates that the MAC address is communicating through the backplane instead of through a front panel interface.

To open the Device Find Source Address window:

1. Click on **Device** in the Chassis View menu bar.
2. Click to select **Device Find Source Address**. The Device Find Source Address window, as shown in Figure 2-10, opens.

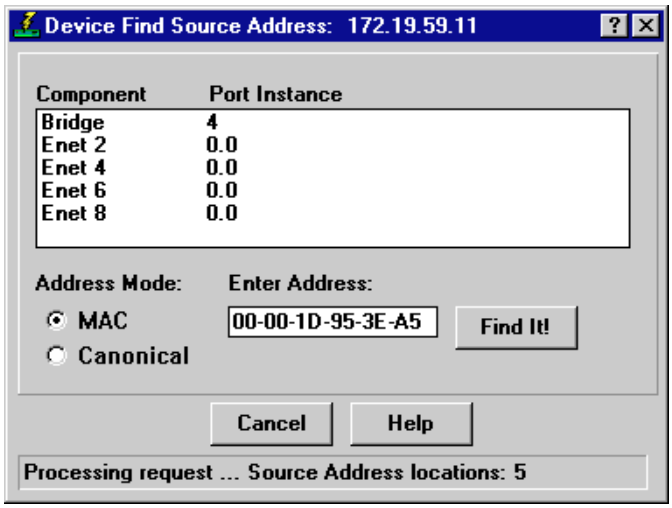


Figure 2-11. Device Find Source Address Window

The Device Find Source Address window displays the following information:

Component

Displays the type of interface through which the specified MAC address is communicating. This field will display **Bridge** and **Enet #,** indicating that the specified MAC address was found on a bridging interface and on an Ethernet repeater channel.

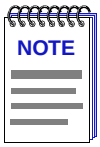
Port Instance

Displays the port index number associated with the interface on which the specified MAC address was found. For an address found on a bridging interface, this field displays the bridge interface index number on which the specified MAC address was found. For an address found on a repeater port, this field displays the board (port group) number and the port index number on which the specified

MAC address was found. The board and port index numbers are separated by a period; for example, a Port Instance of 1.2 refers to board (port group) 1 and port number 2.

To use the Device Find Source Address window:

1. In the **Address Mode** field, select the format of the Source Address you wish to find, either **MAC** or **Canonical**.
2. In the **Enter Address** text box, enter the Source Address you wish to find in the appropriate XX-XX-XX-XX-XX-XX format.



*If you enter the MAC format of a specified address, and then click on **Canonical**, NetSight Element Manager will do the address conversion for you, from the Ethernet hexadecimal format to the Token Ring Canonical format. The same is also true if you enter the Canonical format of a specified address and then select **MAC**.*

3. Click on the **Find It!** button. A "**Processing Request**" message displays in the status bar at the bottom of the window.

If the specified MAC address is located, a list of the interface(s) through which the given address is communicating displays in the list box. A status message at the bottom of the window will display the number of interfaces through which the given MAC address is communicating.

If the specified MAC address cannot be found, a "**Source Address not found**" message displays.

Managing the Hub

In addition to the performance and configuration information described in the preceding sections, the Chassis View also provides you with the tools you need to configure your device and keep it operating properly. Hub management functions include setting operating parameters for Ethernet, Fast Ethernet, Gigabit Ethernet, and COM ports; redirecting traffic; viewing system resources; performing 802.1Q VLAN configuration; setting broadcast suppression; configuring port priority; setting device date and time; and enabling and disabling ports.

Configuring Ports

The Configuration options available for FDDI, Ethernet, Fast Ethernet, Gigabit Ethernet, and COM ports allow you to configure operating parameters specific to each port type: for FDDI and standard Ethernet ports, you can set the Duplex Mode; for Fast Ethernet ports on first generation devices, you can set a variety of duplex mode and negotiation parameters; for Fast Ethernet and Gigabit Ethernet ports on second generation devices you can set speed, duplex mode, and flow

control parameters; and for COM ports, you can select the operation you wish the port to perform, and set any associated speed parameters. FDDI, Ethernet, Fast Ethernet, and Gigabit Ethernet Port Configuration windows are available from the Chassis View Port menus (except on Ethernet MicroLAN Switches where they are available from the Bridge Port menu); the COM Port option is available from the Device menu.

Configuring Standard Ethernet and FDDI Ports

The Port Configuration window available for both standard Ethernet and FDDI ports allows you to set an interface to either Standard or Full Duplex Mode. Full Duplex mode effectively doubles the available wire speed by allowing the interface to both receive and transmit simultaneously. This window will also display the mode currently in effect on the selected interface.

To access the Port Configuration Window:

1. From the Chassis View, click to select the port you wish to configure; the Port Menu will display.
2. Click on **Configuration.** The Port Configuration window, Figure 2-12, opens.

To access the Port Configuration window on SmartSwitch 2000 Ethernet MicroLAN Switches:

1. From the Chassis View, click on **Device** in the menu bar to access the Device menu.
2. Click on **Bridge Status**. In the resulting window click on the **Bridge Port** button (e.g., 1) to access the Bridge Port menu.
3. Click on **Configuration.** The Port Configuration window, Figure 2-12, opens.

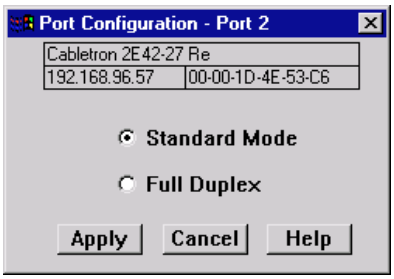


Figure 2-12. The Port Configuration Window

TIP

*If you select the **Configuration** option available for a Fast Ethernet interface, an entirely different window opens; see **Configuring Fast Ethernet Ports on First Generation Devices**, on page 2-29, or **Configuring Ethernet Ports on Second Generation Devices**, on page 2-34, for information on configuring these ports.*

*For standard Ethernet interfaces, Full Duplex should **only** be enabled on an interface that has a connection to a single destination address at the other end of the connection (i.e., it is not a segment with an attached repeater cascading the connection to multiple destination addresses).*

Full Duplex mode disables the collision detection circuitry at the interface, so that both Transmit and Receive wires can be used simultaneously. With a single destination address at the other end of the connection (for example, if the connection was to a full duplex interface on another switching device, or if a single file server was connected to the full duplex switch port), this essentially doubles the available bandwidth from 10 Mbit/sec to 20 Mbit/sec. Note that the interface at the other end of the connection must also have Full Duplex enabled at the attached interface.

*Full Duplex mode **must** be disabled if the interface is communicating with multiple destinations simultaneously (i.e., if a repeater is cascaded from the interface), since Ethernet relies on Collision Sense for proper operation.*

*Similarly, an FDDI Full Duplex connection must also only be run point-to-point between two supporting FDDI interfaces (e.g., another HSIM-F6), since the dual bandwidth is attained by running data on both primary and secondary paths simultaneously. Since Full Duplex overrides standard FDDI protocol (and eliminates ring redundancy), it will not operate in a "ring" configuration, but only as a point-to-point high speed data trunk between hubs. Note that you must use Local Management to configure your HSIM-F6 for Full Duplex operation **prior** to making physical connections. Refer to your Local Management Guide for more information.*

Use the options in this window to select the desired mode:

Standard Mode

In Standard Mode, an interface can only either transmit *or* receive at any given time, and must wait for one activity to be completed before switching to the next activity (receive or transmit). In this mode, standard wire speeds (10 Mbps for Ethernet, 100 Mbps for FDDI) are available.

Full Duplex

In Full Duplex Mode, an interface can both receive *and* transmit packets at the same time, effectively doubling the available wire speed to 20 Mbps (for Ethernet) or 200 Mbps (for FDDI).

Be sure to click on the **Apply** button to set your changes; note that the interface's current mode can be determined by the field selected in the window.

Configuring Fast Ethernet Ports on First Generation Devices

The SmartSwitch 2000 has two front panel slots (Ports 25 and 26) for Fast Ethernet Interface Modules: the FE100-TX and FE100-FX. If you have any Fast Ethernet Interface Modules installed in the front panel slots of your first generation SmartSwitch 2000 device, the Fast Ethernet Configuration window available for

those ports allows you to both view and set that port's available modes. All 100Base-TX Fast Ethernet ports can be configured to operate in either standard Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) mode, and in each mode can be configured to operate in Full Duplex, effectively doubling the available wire speed (from 10 to 20 Mbps in standard Ethernet mode, or from 100 to 200 Mbps in Fast Ethernet mode); 100Base-FX (fiber) ports can be configured to operate in their standard 100 Mbps mode, or in full duplex mode. This window also displays the mode currently in effect on the selected interface, and provides some information (where it is available) about the interface's link partner.

To access the Fast Ethernet Configuration Window:

1. From the Chassis View, click to select the Fast Ethernet port you wish to configure; the Port Menu will display.
2. Click on **Configuration.** The Fast Ethernet Configuration window, Figure 2-13, opens.

To access the Fast Ethernet Configuration window on SmartSwitch 2000 Ethernet MicroLAN Switches:

1. From the Chassis View, click on **Device** in the menu bar to access the Device menu.
2. Click **Bridge Status**. In the resulting window click on the **Bridge Port** button (e.g., 1) to access the Bridge Port menu.
3. Click **Configuration.** The Fast Ethernet Configuration window, Figure 2-13, opens.

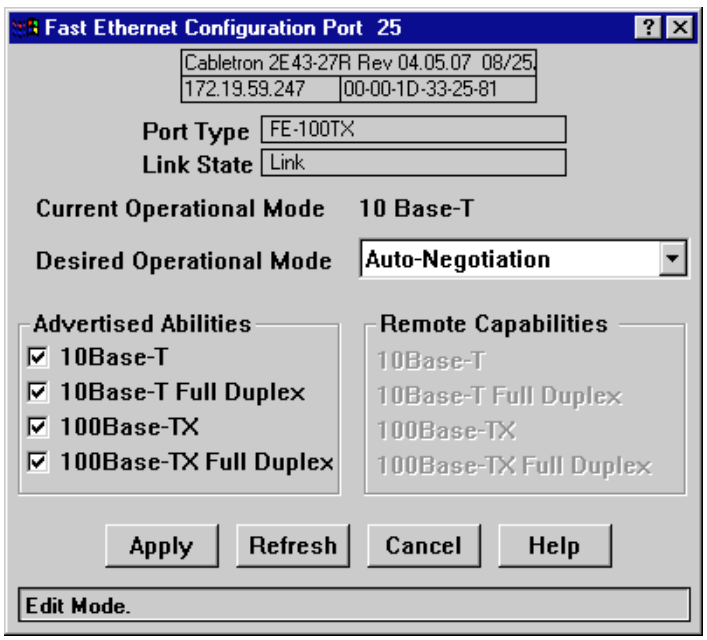
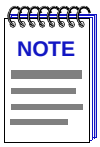


Figure 2-13. The Fast Ethernet Port Configuration Window



Auto-Negotiation is not supported by the FE-100FX Fast Ethernet port interface module. If you launch the window for a port module slot which has no FE module installed, the Port Type will display as Unknown, the Link State will display No Link, and the rest of the fields will be blank and/or grayed out.

If you select the Configuration option available for a standard Ethernet or FDDI interface, or for an Ethernet port on a second generation device, an entirely different window opens; see ***Configuring Standard Ethernet and FDDI Ports****, on page 2-28, or* ***Configuring Ethernet Ports on Second Generation Devices****, page 2-34, for information on configuring these ports.*

From this window you can manually set the operational mode of the port, or — for 100Base-TX interfaces — set the port to auto negotiation so that the appropriate operational mode can be determined automatically. The mode you set will determine the speed of the port and whether it uses Full Duplex or Standard Mode bridging.

The following information about the selected Fast Ethernet port is displayed:

Port Type
Displays the port's type: FE-100TX (for the FE-100TX Fast Ethernet port module), FE-100FX (for the FE-100FX Fast Ethernet port module), or Unknown (for a port slot with no module installed).

Link State
Displays the current connection status of the selected port: Link or No Link.

Current Operational Mode
Indicates which of the available operational modes is currently in effect: 10Base-T, 10Base-T Full Duplex, 100Base-TX, 100Base-TX Full Duplex, 100Base-FX, or 100Base-FX Full Duplex. If the port is still initializing, not linked, or if there is no port module installed in the slot, this field will remain blank.

Desired Operational Mode
Displays the operational mode that you have selected for this port, and allows you to change that selection. The following operational modes are available for each port:

100Base-TX Auto Negotiation, 10Base-T, 10BASE-T Full Duplex, 100Base-TX, and 100Base-TX Full Duplex.

100Base-FX 100Base-FX and 100Base-FX Full Duplex

If you choose to select a specific mode of operation (rather than auto-negotiation), you should be sure that the link partner supports the same mode. Otherwise, no link will be achieved.

If you select a Full Duplex mode and the link partner supports the same wire speed but not Full Duplex, a link will be achieved, but it will be unstable and will behave erratically.

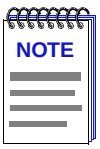
If you select Auto-Negotiation, the local node will try to match the mode of the link partner, even if the link partner is not set to auto-negotiate, and even if the local node must use a mode which it is not currently advertising.

If Auto Negotiation is the selected mode, the **Current Operational Mode** field will indicate which mode was selected by the link partners. See **Setting the Desired Operational Mode**, on page 2-33, for more information.

Advertised Abilities

For 100Base-TX ports which have been configured to operate in Auto Negotiation mode, this field allows you to select which of the operational modes available to the port can be selected by the negotiating link partners. During Auto Negotiation, each of the link partners will advertise all selected modes in descending bandwidth order: 100Base-TX Full Duplex, 100Base-TX, 10Base-T Full Duplex, and 10Base-T. Of the selected abilities, the highest mode mutually available will automatically be used. If there is no mode mutually advertised, no link will be achieved.

If you have selected a specific operational mode for your 100Base-TX port, the Advertised Abilities do not apply; the selected Advertised Abilities also do not restrict the local node's ability to set up a link with a partner who is not currently Auto-Negotiating.



Auto-Negotiation is not currently supported for 100Base-FX ports.

Remote Capabilities

When the local node is set to Auto-Negotiation, this field will display the advertised abilities of the remote link — even if the remote link is not currently set to auto-negotiate. Possible values for this field are:

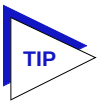
- 100Base-TX Full Duplex
- 100Base-TX
- 10Base-T Full Duplex
- 10Base-T

- Link Partner does not support auto negotiation — auto negotiation is either not supported by or is not currently selected on the remote port.
- Unknown — the link partner's capabilities could not be determined.

When the local node is ***not*** set to Auto-Negotiation, this field will be grayed out, even if the link partner is set to Auto-Negotiation and is advertising abilities.

Setting the Desired Operational Mode

For any 100Base-TX port, you can specifically choose any one of the four available operational modes, or you can select Auto-Negotiation mode, which allows the port to negotiate with its link partner to find the highest mutually available bandwidth. If you select Auto Negotiation mode, you must also choose which of the port's bandwidth capabilities you wish to advertise to the link partner.



If you select Auto-Negotiation at both ends of a link, be sure at least one mutually-advertised operational mode is available.

For a 100Base-FX port, the selection process is somewhat simpler; Auto Negotiation for these ports is not supported at this time, so you need only choose between 100Base-FX standard mode and 100Base-FX Full Duplex. However, you must still be sure that both link partners are set to the same operational mode, or the link will be unstable.

To set your desired operational mode:

1. Click on the **Desired Operational Mode** combo box to display the menu of available options; click to select the operational mode you wish to set.

   For 100Base-TX ports, the available options are:

   10Base-T — 10 Mbps connection, Standard Mode

   10Base-T Full Duplex — 10 Mbps connection, Duplex Mode

   100Base-TX — 100 Mbps connection, Standard Mode

   100Base-TX Full Duplex — 100 Mbps connection, Duplex Mode

   Auto Negotiation — the operational mode will be dynamically set based on the modes selected in the Advertised Abilities field (where both link partners are auto-negotiating) and the speeds and modes supported by the attached device.

   For 100Base-FX ports, options are:

   100Base-FX — 100 Mbps connection, Standard Mode

   100Base-FX Full Duplex — 100 Mbps connection, Duplex Mode

2. If you have selected Auto Negotiation (for 100Base-TX ports only), use the **Advertised Abilities** field to select the operational capabilities you wish to advertise to the port's link partner. If both link partners will be auto-negotiating, be sure there is at least one mutually-advertised operational mode, or no link will be achieved.

The selected Advertised Abilities only come into play when both link partners are auto-negotiating; if only one link partner is set to auto-negotiate, that node will establish a link at whatever mode its partner is set to, even if that mode is not currently being advertised.

3. Click **Apply** to save your changes. Click **Refresh** to display the new settings. It may take a few minutes for mode changes to be completely initialized, particularly if the link partners must negotiate or re-negotiate the mode; you may need to refresh the window a few times before current operational data is displayed.

Configuring Ethernet Ports on Second Generation Devices

The Ethernet Configuration window available for Fast Ethernet and Gigabit Ethernet ports on second generation devices (e.g., 2H252-25R and 2H258-17R) allows you to both view and set those ports' available speed, modes, and flow control. All second generation devices support the *ctEthernetParameters* MIB. All Ethernet ports that return at least one instance for a query of the *ctEtherSupportedDuplex* OID will use the Ethernet Configuration window as shown in Figure 2-14.

All 100Base-TX Fast Ethernet ports can be configured to operate in either standard Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) mode, and each mode can be configured to operate in Full Duplex effectively doubling the available wire speed (from 10 to 20 Mbps in standard Ethernet mode, or from 100 to 200 Mbps in Fast Ethernet mode). 100Base-FX (fiber) ports can be configured to operate in their standard 100 Mbps mode, or in Full Duplex mode. 1000Base-SX/LX/CX Gigabit Ethernet ports are always configured to operate in 1000 Mbps, Full Duplex mode.

This window displays the mode currently in effect on the selected interface, and provides some information (where it is available) about the interface's link partner.

To access the Ethernet Configuration Window:

1. From the Chassis View, click to select the port you wish to configure; the Port Menu will display.
2. Click on **Configuration.** The Ethernet Configuration window, Figure 2-13, opens.

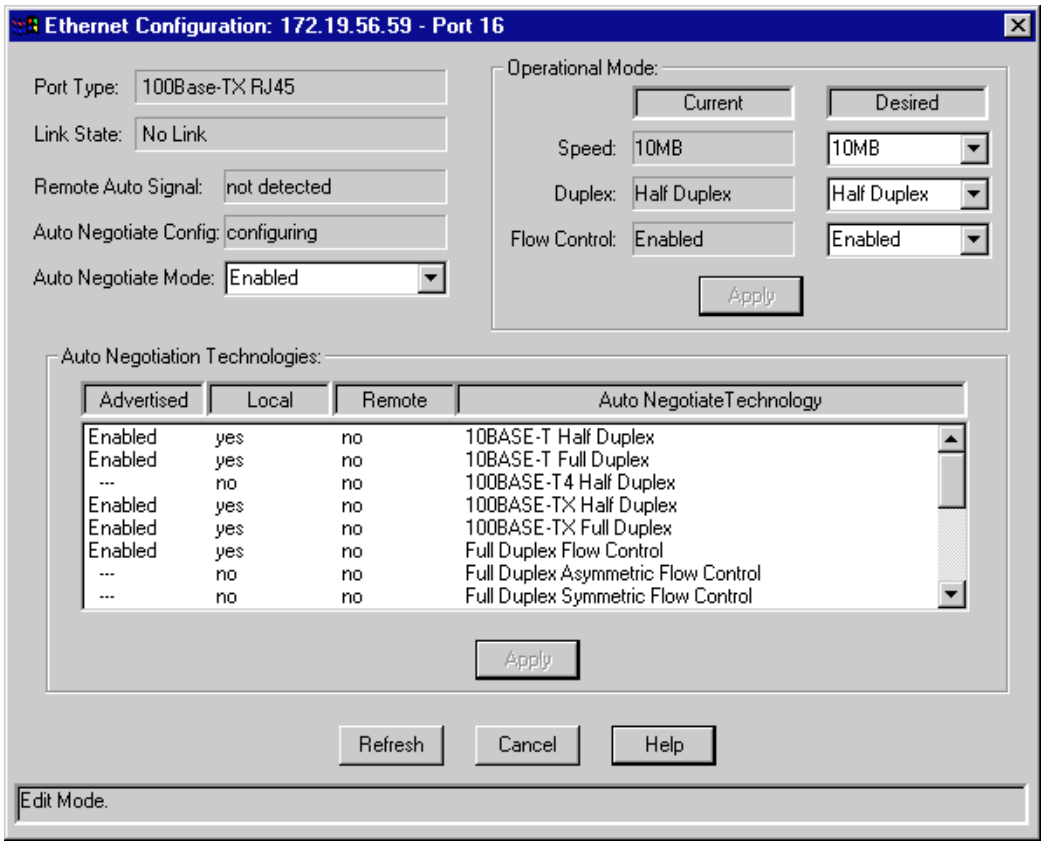


Figure 2-14. The Ethernet Configuration Window

TIP

If you select the Configuration option available for a standard Ethernet or FDDI interface or for a Fast Ethernet port on a first generation device, an entirely different window opens; see ***Configuring Standard Ethernet and FDDI Ports****, page 2-28, or* ***Configuring Fast Ethernet Ports on First Generation Devices****, page 2-29, for information on configuring these ports.*

From this window you can manually set the operational mode of the port, or — for 100Base-TX and 1000Base-SX / LX / CX interfaces — set the port to Auto Negotiate so that the appropriate operational mode can be determined automatically. The mode you set will determine the port's speed, duplex mode, and flow control.

The window displays the following information about the selected Ethernet port:

Port Type
Displays the port's type: 100Base-TX RJ-45or RJ71 (for built-in Fast Ethernet ports and the FE-100TX Fast Ethernet port module), 100Base-FX MMF SC Connector

(for the FE-100FX Fast Ethernet port module), 1000Base-SX / LX / CX (for the VHSIM-G6 Gigabit Ethernet port module), or Unknown (for a port slot with no module installed).

Link State
Displays the current connection status of the selected port: Link or No Link.

Remote Auto Signal
Indicates whether the operating mode at the remote end of the link is set to Auto Negotiate.

Auto Negotiate Config
Indicates whether Auto Negotiate signalling is in progress or has completed. Possible values for this field are: configuring, complete, disabled, parallel detect failed, or other.

Auto Negotiate Mode
Use this field to enable or disable Auto Negotiate for the port. If Auto Negotiate is disabled, the port will use the speed, duplex mode, and flow control settings specified in the Operational Mode fields. Note that 100-BaseFX ports do not support Auto Negotiation; they must use the control settings specified in the Operational Mode fields.

Operational Mode Fields

If the port is *not* set to Auto Negotiate then the settings in the Operational Mode fields are used.

If you choose to select a specific mode of operation (rather than auto negotiation), you should be sure that the link partner supports the same mode. Otherwise, no link will be achieved.

For example, if you select Full Duplex mode and the link partner supports the same wire speed but not Full Duplex, a link will be achieved, but it will be unstable and will behave erratically.

If you select Auto-Negotiation, the local node will try to match the mode of the link partner, even if the link partner is not set to auto-negotiate, and even if the local node must use a mode which it is not currently advertising.

The **Current Operational Mode** settings indicate which of the available operational modes is currently in effect. If Auto Negotiate is the selected mode, the Current Operational Mode fields will indicate which mode was selected by the link partner.

The **Desired Operational Mode** settings display the operational mode that is currently selected for this port, and allows you to change the selection.

The following operational modes can be specified:

Speed
This field specifies a port speed of 10MB, 100MB, or 1000MB.

Duplex
This field specifies Half Duplex or Full Duplex mode for the port.

Flow Control
Flow control allows Ethernet devices to notify attached devices that congestion is occurring and that the sending device should stop transmitting until the congestion can be cleared. There are two commonly used methods of flow control: Frame-based (operates on Full Duplex links) and Backpressure (operates on Half Duplex links).

Ports set to Full Duplex mode have frame-based flow control, using pause control frames. Frame-based flow control options are:

Symmetric	The port is able to both receive and transmit pause control frames.
Asymmetric RX	This option appears only for Gigabit Ethernet ports. The port will receive pause control frames, but will not transmit its own.
Asymmetric TX	This option appears only for Gigabit Ethernet ports. The port is capable of sending pause control frames, but will not acknowledge received pause control frames.
Disabled	Disables flow control on the port.
Auto Negotiate	Ports configured to operate in auto negotiation mode will only use pause control frames if the negotiation process determines that the link partner supports them. Both ends of the link must support auto negotiation and a common mode of operation.

Ports set to Half Duplex mode use Backpressure flow control. Backpressure flow control simply asserts the carrier sense signal out the port causing the device transmitting to detect a collision, stop transmitting data, and send the jam signal. Backpressure flow control options are enabled or disabled.

Setting the Desired Operational Mode

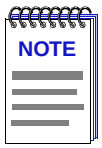
For any 100Base-TX port, you can configure operational modes, or you can select Auto Negotiate mode, which allows the port to negotiate with its link partner to find the highest mutually available bandwidth and flow control. If you select Auto Negotiate mode, you must also choose which of the port's bandwidth and flow control capabilities you wish to advertise to the link partner (refer to **Auto Negotiation Technologies**, page 2-38).

100Base-FX ports do not support auto negotiation for bandwidth or flow control capability, so you must choose between 100Base-FX Half Duplex and 100Base-FX Full Duplex mode, and set the flow control option. However, you must still be sure that both link partners are set to the same operational mode, or the link will be unstable.

For 1000Base-SX/LX/CX ports the speed and duplex modes are always configured at 1000MB Full Duplex. However, you can select Auto Negotiate mode, which allows the port to negotiate with its link partner to find the highest mutually available bandwidth and flow control. If you select Auto Negotiate mode, you must also choose which of the port's bandwidth and flow control capabilities you wish to advertise to the link partner (refer to **Auto Negotiation Technologies**, page 2-38).

To set your desired operational mode:

1. Click on the **Speed, Duplex,** or **Flow Control** list box to display the menu of available options; click to select the operational mode you wish to set.



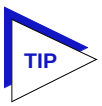
If the port you are configuring does not support Flow Control, the Current Mode field will display "not supported" and the Desired Mode list box will be disabled.

2. Click on the **Apply** button to save your changes.

Auto Negotiation Technologies

For ports which have been configured to operate in Auto Negotiate mode, this list box allows you to select which of the operational modes available to the port will be advertised to the negotiating link partner.

During Auto Negotiation, each of the link partners will advertise all selected modes. Of the selected modes, the highest mode mutually available will automatically be used. If there is no mode mutually advertised, no link will be achieved.



If you select Auto-Negotiation at both ends of a link, be sure at least one mutually-advertised operational mode is available.

If you have manually configured specific operational modes for your 100Base-TX port or if you are configuring a 100Base-FX port, the Auto Negotiation Technologies list box does not apply.

The Auto Negotiation Technologies list box has the following column headings:

Advertised
This column specifies whether the operational mode listed in the far right column of the list box will be advertised to the link partner. Only those operational modes supported by the local port (those with a "yes" listed in the Local column) can be advertised. Valid values are **Enabled** (the mode is supported and will be advertised), **Disabled** (the mode is supported but will not be advertised), and "**---**" (the mode is not supported).

Local
Indicates whether the operational mode listed in the far right column of the list box is supported by the local port.

Remote
Indicates whether the operational mode listed in the far right column of the list box is supported by the remote port.

Auto Negotiate Technology
This column lists possible operational modes.

Setting Advertised Abilities for Auto Negotiation

You can determine which operational mode supported by the local port will be advertised to the negotiating link partner. Of the advertised modes, the highest mode mutually available will automatically be used.

To advertise an operational mode:

1. In the list box, click on the operational mode of choice.

   If the Advertised column had a value of Enabled, it will change to Disabled; a value of Disabled will change to Enabled. If the Advertised column has a value of "---", then the value is not changed.

2. Click **Apply** to save your changes. Click **Refresh** button to display the new settings. It may take a few minutes for mode changes to be completely initialized, particularly if the link partners must negotiate or re-negotiate the mode; you may need to refresh the window a few times before current operational data is displayed.

Configuring the COM Port

You can use the COM Port Configuration window (Figure 2-15) to specify the functions that will be performed by the RS232 COM port on the SmartSwitch 2000 front panel.

1. Click on **Device** in the Chassis View menu bar to display the Device menu.

2. Click on **Com Port Configuration**, and then select **Port 1**, and release. The Com Port Configuration window, Figure 2-15, opens.

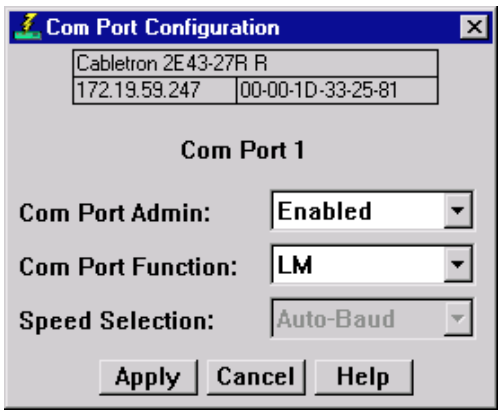


Figure 2-15. The Com Port Configuration Window

You can use the Com Port Configuration window to set the following operating parameters:

Com Port Admin

Use this field to administratively enable or disable the COM port.

Com Port Function

Use this field to select the function for which you wish to use the COM port:

LM	Local Management: select this option if you wish to connect a terminal to the selected COM port from which to run Local Management.
UPS	Select this option if you wish to connect an uninterruptable power supply (UPS) to the selected COM Port. Note that if you select this option, an additional option — UPS — displays on the Device menu; use the resulting window to configure specific UPS settings.
SLIP	Select this option to use the selected COM port as a SLIP connection for out-of-band SNMP management via direct connection to a serial port on your network management workstation. Note that when you configure the port as a SLIP connection, you must select the desired baud rate in the Speed Selection field described below.
PPP	Select this option to use the selected COM port as a PPP connection for out-of-band SNMP management via direct connection to a serial port on your network management

workstation. Note that when you configure the port as a PPP connection, you must select the desired baud rate in the Speed Selection field described below.

Speed Selection
If you have configured the selected port as a SLIP or PPP connection, you must select the appropriate baud rate: 2400, 4800, 9600, or 19,200. Note that this field will default to Auto-Baud and become unselectable when the Com Port Function is set to LM or UPS.

If the COM port you wish to configure is currently set to LM or UPS, the Speed Selection field will be unavailable until the Com Port Function is set to SLIP or PPP and that change is applied. Once available, the Speed Selection field will default to the last known speed setting; use the down arrow to change this setting if necessary, then click the ***Apply*** *button again to complete the configuration.*

To change the configuration of the selected COM port:

1. Click on  to the right of each field and select the desired setting.
2. Click on the **Apply** button to save your changes.

Using an Uninterruptable Power Supply (UPS)

Your SmartSwitch 2000 supports the use of a UPS (uninterruptable power supply) through the COM 1 port. (For more information on the use of a UPS with the SmartSwitch 2000, consult the SmartSwitch 2000 Installation Manual that was included when you purchased the unit.) You can view or change the status of the UPS connected to your SmartSwitch 2000 at the UPS window.

Please note that the UPS menu option will only be available when you have set the Com Port Function to UPS in the COM Port Configuration, and the UPS window will only be active if you currently have a UPS attached to your SmartSwitch 2000 through the appropriate port, and you have correctly set the **Set UPS ID** field.

Do not set the ***Set UPS ID*** *field unless you have a UPS attached to the SmartSwitch 2000, or you will disrupt your use of NetSight Element Manager.*

Accessing the UPS Window

At the UPS window, you can configure the UPS ID model type for the uninterruptable power supply you have attached to the COM port on your SmartSwitch 2000.

You can also view information concerning the UPS connected to your SmartSwitch 2000 including:

- The amount of time that your UPS has been running since the last start-up
- The line voltage and battery output
- The actual battery capacity of the UPS (dynamic bar graph)

You can also use a button at the bottom of the window to disconnect your UPS, or you can use the Test option to initiate a self test of the unit.

To access the UPS window:

1. From the Chassis View window, click on **Device** in the menu bar to access the Device menu.
2. Select **UPS**. The UPS window, Figure 2-16, opens.

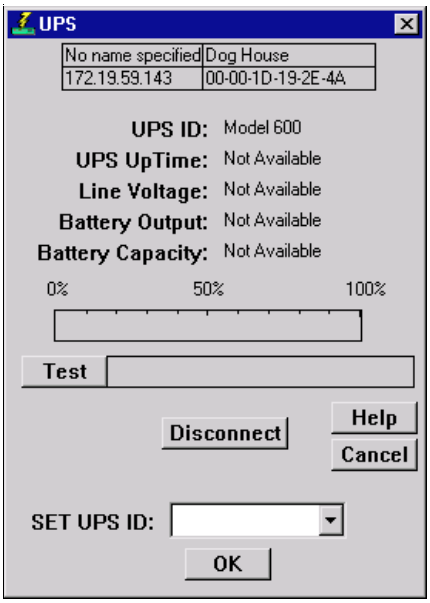


Figure 2-16. The UPS Window

UPS ID

Displays the manufacturer and model typecode of the UPS attached to the COM port of the SmartSwitch 2000. You must assign this typecode for the UPS window to be active. (See **Setting the UPS ID**, on page 2-43, for instructions for setting the typecode for your UPS.) The valid typecodes are:

- Model 370
- Model 400
- Model 600
- Model 900

- Model 1250
- Model 2000
- Matrix 3000
- Matrix 5000
- SU 700
- SU 1400
- SU 2000XL
- Other

UPS Uptime

Displays the number of hours that the UPS has been operating since the last time it was started up.

Line Voltage

Displays the voltage coming through the line attached to the SmartSwitch 2000.

Battery Output

Displays the amount of battery output voltage.

Battery Capacity

Displays the percentage of remaining battery capacity (100% indicates a fully charged battery).

Test Results

Displays the result of the last self-test performed by the UPS. The possible test results are:

Unit OK	The UPS unit is in working order.
Unit Failed	The UPS unit has failed the self-test. Check the unit for damage or consult your UPS User's Manual.
Bad Battery	The UPS unit battery is bad.
No recent test	No UPS self-test has been performed in the last five minutes.
Unit in test... Please standby	The UPS is currently in test mode.

Setting the UPS ID

You need to set the UPS ID typecode that indicates the manufacturer and model of the UPS.

To set the UPS ID:

1. Click on  next to the SET UPS ID text box. A Model number menu displays. Scroll to highlight the appropriate UPS ID. (Consult the manual that was included when you purchased your UPS for the correct Model ID number.)
2. Click **OK**. The UPS ID you have chosen displays in the text box, and the UPS window will be active.

If your UPS unit does not function after you have set this ID, check the manual you received with the UPS to ensure that you have chosen the correct UPS ID. If you need to change the ID, follow the directions given above.

Using the Test Option

You can use the test option to activate a self-test cycle for your unit. This self-test will check the viability of your unit and its battery.

To activate the test:

1. Click on the **Test** button. The unit will begin its self-test. The results of the test display in the Test Result text box next to the Test button.

Using the Disconnect Option

You can disconnect the UPS attached to your SmartSwitch 2000 through its com port, as follows:

1. Click on the **Disconnect** button near the bottom of the UPS window. Your UPS will now be disconnected.

To reconnect, click **OK**, or close, then re-open the UPS window.

Redirecting Traffic on the SmartSwitch 2000

The Port Redirect window (Figure 2-17) allows you to redirect traffic from one or more interfaces directly to another interface — essentially mirroring the traffic at the “redirect” interface. This feature is useful in that it allows you to use an external analyzer on the “redirect” port to analyze data, without disturbing the normal switching operations at the original source ports. The Port Redirect window displays the interface remap table and allows you to add new entries to and delete existing entries from this table. When you set a source port to redirect to a destination port, the destination port will transmit out all packets received or transmitted on the source port.

To access the Port Redirect window:

1. Click on **Device** in the Chassis View menu bar to display the Device menu.
2. Click **Port Redirector**. The Port Redirect window, Figure 2-17, opens.

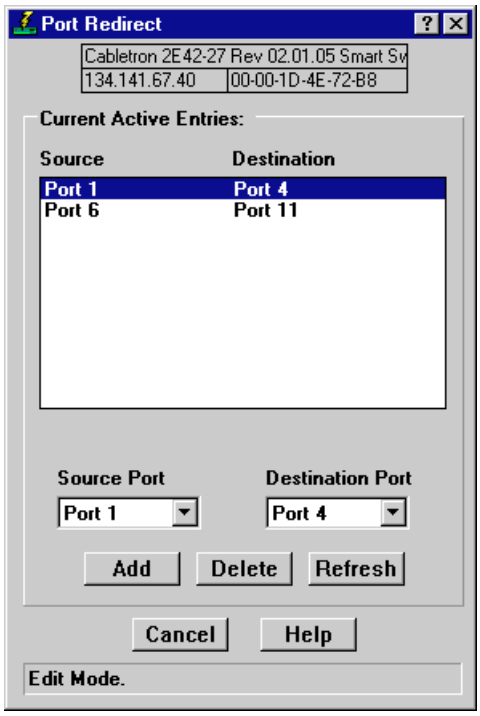


Figure 2-17. The Port Redirect Window

The current port mappings will be listed in this window. You may add or delete entries from this window.

To add an entry:

1. Next to the Source Port display box click on  and select the desired source port (**Port X)** from the drop down list.
2. Next to the Destination Port display box click on  and select the desired destination port (**Port X)** from the drop down list.
3. Click **Add** to add the redirect pair you have just configured to the list.

   The new entry will now be displayed in the Current Active Entries list in this window and the port traffic will begin to be redirected.

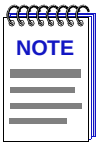
To delete an entry:

1. Highlight the entry line in the current active entries list that you wish to delete.
2. Click **Delete** to remove the redirect pair you have highlighted from the current active entries list.

   The entry will be deleted from the current active entries list and the traffic from the source port will not be redirected to the destination port any longer.

Priority Configuration

The SmartSwitch 2000 devices support priority packet forwarding. Priority packet forwarding lets you designate certain packets to be of higher importance than others, thereby allowing for the forwarding of these packets before packets of lower priority. This functionality is essential for time-critical applications — such as real-time video — on shared networks.



*The **Priority Configuration** menu option will only appear in the **Device** menu for devices that respond to **any** of NetSight Element Manager's queries to the following OIDs: **ctPriorityExtPortStatus**, **ctPriorityExtMaxNumMACEntries**, or **ctPriorityExtNumPktTypeEntries**. If your device's firmware does not respond to these queries, contact the Global Technical Assistance Center for upgrade information.*

Frame priority is enabled by the "tagging" of MAC frames so that they are given a priority designation when they are forwarded by the SmartSwitch 2000 device — which is a tag-aware switch (i.e., one that adheres to the IEEE P802.1p and IEEE P802.1q Draft Standards). Tagging a frame is accomplished by adding a Tag Header to a frame immediately following its original Destination and Source MAC address fields (and any routing fields, if present), and then recomputing the Frame Check Sequence (FCS) appropriately. On receiving such a frame, a tag-aware switch will read the priority from the tagged portion of the frame, remove the Tag Header, recompute the FCS, and then direct it to its appropriate transmission queue.

There are eight priority levels — indicated 0 through 7— available to designate user priority. Frames tagged with a 0 represent the lowest priority level (or normal) traffic, and frames tagged with a 7 indicate the highest priority level traffic.

The SmartSwitch 2000 itself supports two transmission queues: one that is for 0 or normal priority traffic (or any non-tagged traffic), and a second queue that is reserved for frames that have been tagged with a priority level of 1 or higher. On receiving any priority-tagged frames, the SmartSwitch 2000 will forward them out of the high priority queue before forwarding any frames in the normal priority queue. However, the SmartSwitch 2000 will tag outgoing frames with the full range of eight priority levels, so that upon reception, a device that supports the entire range of priority queuing will forward the frame appropriately.

You can use NetSight Element Manager to configure the criteria that determine the priority in which frames will be queued for transmission by your SmartSwitch 2000. Several different criteria can be used to determine a frame's transmission queue order:

- The device and port at which the frame was received.
- The destination and / or source MAC address associated with the frame.
- A combination of destination and / or source MAC address and the frame's protocol type.
- The frame's protocol type.

When you configure the transmission queue for a specific frame, an entry is made in one of three priority tables maintained by the SmartSwitch 2000 device. These tables are used to determine which transmit queue to use — normal priority or high priority — when forwarding frames.

- The *ctPriorityExtPortTable* maintains priority entries based on a frame's receive port.
- The *ctPriorityExtMACTable* maintains priority entries based on a frame's MAC-layer information.
- The *ctPriorityExtPktTypeTable* maintains priority entries based on the frame's protocol type.

The following sections discuss how to use the Port Priority Configuration window, the MAC Based Priority Configuration window, and the Frame Priority Configuration window to make entries in these transmit priority tables.

Configuring Priority Queuing Based on Receive Port

You can use the Port Priority Configuration window, Figure 2-18, to determine packet queuing based solely upon the port at which the packet was received. This allows you to ensure that a connected user or LAN segment will have priority when frames that were received on that port are queued for transmission.

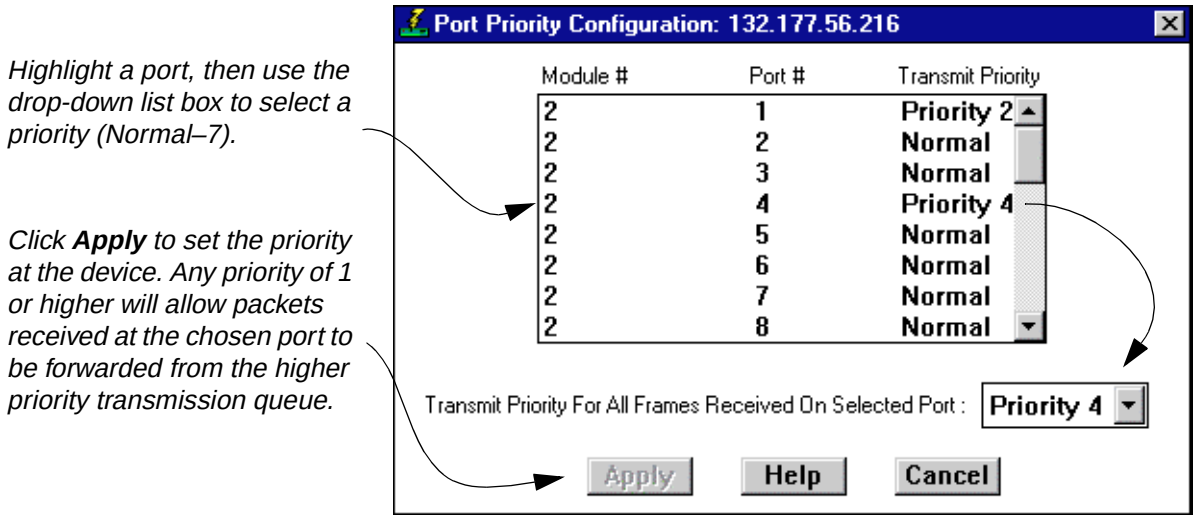


Figure 2-18. The Port Priority Configuration Window

NOTES

In the event that an incoming packet received on a designated port already has a priority associated with it, you can use the ***ctPriorityExtPortFwdInboundPriority*** *OID to determine whether the incoming priority should remain intact, or be replaced with the priority that you have set for the receiving port.*

Use the MIB Tools utility suite to set the ***ctPriorityExtPortFwdInboundPriority*** *OID to 1 (for the appropriate port instance) if you want the incoming packet to retain its originally set priority when received by the port; set the OID to 2 if you want the packet to take the default priority set for the receiving port. Refer to the* **Tools Guide** *for information on using the MIB Tools suite.*

To access the Port Priority Configuration window:

1. Click on **Device** to access the Device menu.
2. Click on **Priority Configuration**, and then select **Port Based** from the menu. The Port Priority Configuration window opens.

The Port Priority Configuration window displays the contents of the *ctPriorityExtPortTable*. It has a list box that displays the front panel interfaces supported by the SmartSwitch 2000 device, along with the slot number occupied by the module (for the SmartSwitch 2000, the slot number will always be **1**), and any transmit priority that has been assigned to those interfaces.

To assign a transmit priority to a port:

1. Click to highlight the port interface of interest in the **Port #** column. Each interface is identified by its MIBII *IfIndex*.

2. Click on the **Transmit Priority** drop-down list box, and scroll to select the desired priority level (**Normal–7**) for forwarding packets received on the selected port.

NOTE

Since the SmartSwitch 2000 device has two transmit queues, a priority of Normal will cause packets received on that port to be forwarded through the lower priority queue, and any priority of 1 through 7 will cause the packets to be forwarded through the higher priority queue. However, other tag-aware switches may use the full range of eight priority queues — so the priority that you assign may have bearing on how the frame is forwarded when it is received by another device.

3. Click **Apply**. The defined priority displays next to the port in the Transmit Priority column.

Configuring Priority Queuing Based on MAC-layer Information

You can use the MAC Based Priority Configuration window, Figure 2-19, to determine packet queuing based upon the packet's Source and / or Destination MAC address, as well as the packet's frame Type. These priority entries, based on the frame's MAC-layer information, are maintained in the *ctPriorityExtMACTable*. You can create up to 1024 priority entries for queuing frames based upon on MAC-layer information.

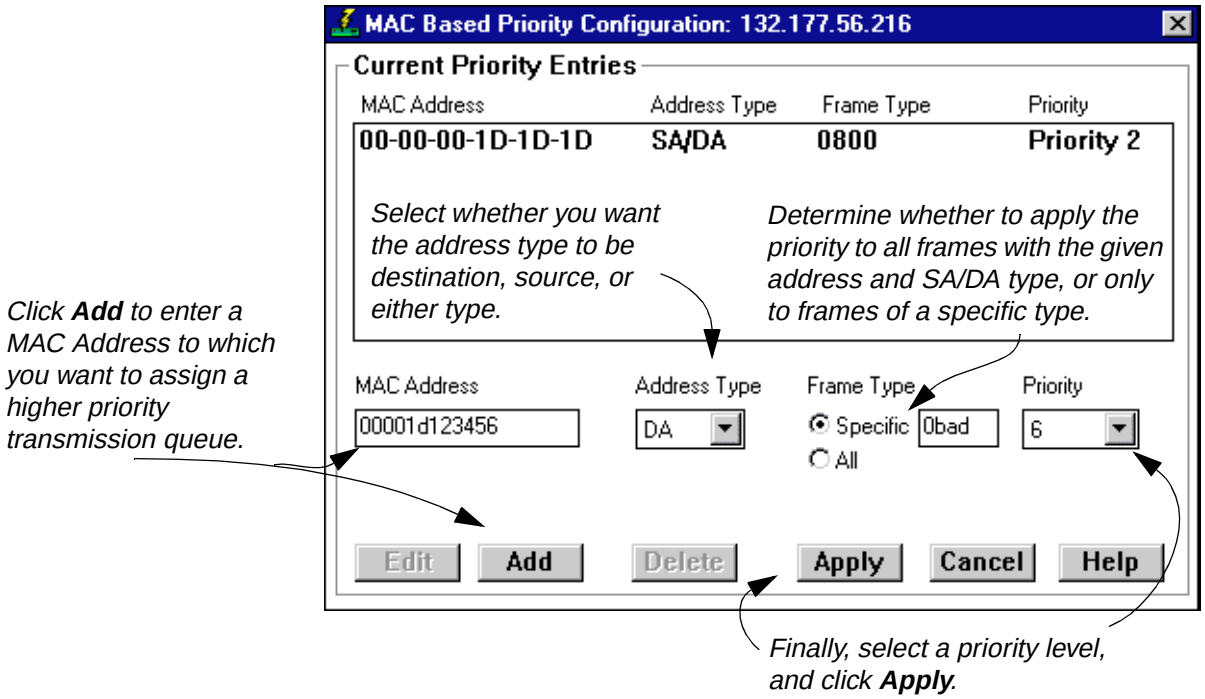


Figure 2-19. The MAC Based Priority Configuration Window

To access the MAC Based Priority Configuration window:

1. Click on **Device** to access the Device menu.
2. Click on **Priority Configuration**, and then select **MAC Based** from the menu. The MAC Based Priority Configuration window opens.

The MAC Based Priority Configuration window contains the following information:

Current Priority Entries

The Current Priority Entries list box displays any MAC-based priority entries that have been configured for the SmartSwitch 2000 device. It has four columns:

- MAC Address, which identifies the physical address for which a frame transmit priority entry has been configured.
- Address Type, which identifies whether the address of interest is in the source or destination field, or in both fields, of the frame.
- Frame Type, which indicates whether all frames with the given address will have a transmit priority, or whether a specified frame Type will be used in combination with the address.
- Priority, which displays the current transmit priority assigned to the entry.

Below the Current Priority Entries list box, several text fields and command buttons allow you to configure or edit MAC-based priority entries:

MAC Address

This text field allows you to enter a new MAC address that will have a transmit priority associated with it.

Address Type

This drop-down list box allows you to select whether the given MAC address must be in the source address portion of the frame (SA), the destination address portion (DA), or in either portion (SA / DA).

Frame Type

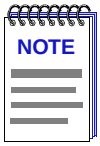
This radio button / text box combination allows you to choose whether **All** frame Types with the given address will be given priority, or whether frames of a **Specific** type (as defined in the associated text box) will be given priority.

Priority

Priority, which indicates the transmit priority level assigned to the configured entry.

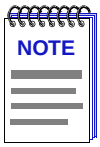
To assign a transmit priority based on MAC-layer information:

1. Click on the **Add** button. The entry fields will be activated.
2. Click in the **MAC Address** text box, and type in the physical address in XX-XX-XX-XX-XX-XX format, where X is a valid hexadecimal value (A-F or 0-9), for which you want to configure a transmit priority.
3. Click on the **Address Type** drop-down list box, and select whether you want the specified address to be in the Source Address portion of the frame (**SA**), the Destination Address portion (**DA**), or in either portion (**SA/DA**).
4. Specify a **Frame Type** that you want associated with the frame:
   a. Click on the appropriate Frame Type option button: **Specific** if you want a certain Frame Type associated with the given MAC address, or **All** if you do not care about the Frame Type.
   b. If you select Specific, click in the associated text box and type in the two-byte hexadecimal value for that protocol type (e.g., 0BAD for Banyan frames).



When creating priority entries, you can specify up to four Frame Types for the same MAC Address value.

5. Click on the **Priority** drop-down list box, and scroll to select the desired priority level — **Normal (0)–7 —** for forwarding packets received with the specified MAC-layer information.



Since the SmartSwitch 2000 has two transmit queues, a priority of Normal will cause packets to be forwarded through the lower priority queue, and any priority of 1 through 7 will cause the packets to be forwarded through the higher priority queue.

6. Click **Apply**. The Current Priority Entries list box will be updated with the newly created entry.

You can edit an existing address entry by changing the priority currently associated with the entry. To do so:

1. Highlight the desired entry in the Current Priority Entries list box, and click on the **Edit** button. The Priority drop-down list box will be activated. (All other parameters will remain grayed-out, since they cannot be edited once they are initially configured).

2. Click on the **Priority** drop-down list box, and scroll to select the new priority level (**Normal–7**) for forwarding packets received with the specified MAC-layer information.

3. Click the **Apply** button. The Current Priority Entries list box will be updated with the newly edited entry.

To clear a priority entry from the *ctPriorityExtMACTable*:

1. Highlight the desired entry in the Current Priority Entries list box, and click on the **Delete** button. The entry fields will be cleared from the table.

Configuring Priority Queuing Based on Packet Type

You can use the Frame Priority Configuration window, Figure 2-20, to determine packet queuing based solely upon its Type field data. Frame type entries are maintained in the *ctPriorityExtPktTypeTable*. You can configure up to 15 frame Type priority entries for the device.

*Click **Add** to activate the Frame Type field, then type in the 2 byte hexadecimal frame Type.*

Use the drop-down list box to select a priority (Normal–7) associated with that frame Type.

*Click **Apply** to set the priority at the device. Any priority of 1 or higher will allow packets received at the chosen port to be forwarded from the higher priority transmission queue.*

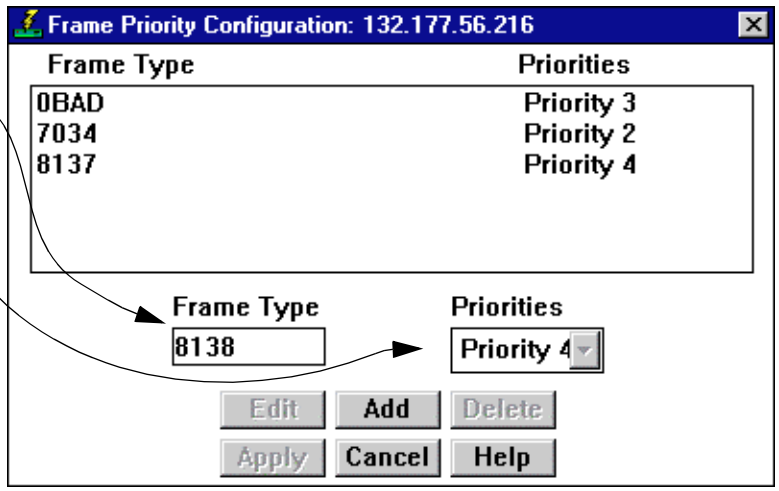


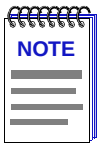
Figure 2-20. The Frame Priority Configuration Window

To assign a transmit priority based on frame Type information:

1. Click on the **Add** button. The entry fields will be activated.

2. Click in the **Frame Type** text box, and type in the 2-byte frame Type in XXXX format, where X is a valid hexadecimal value (A-F or 0-9), for which you want to configure a transmit priority (e.g., 8137 for Novell Type 1 frames).

3. Click on the **Priority** drop-down list box, and scroll to select the desired priority level (**Normal–7**) for forwarding packets received with the specified Type field information.



Since the SmartSwitch 2000 has two transmit queues, a priority of Normal will cause packets to be forwarded through the lower priority queue, and any priority of 1 through 7 will cause the packets to be forwarded through the higher priority queue.

4. Click **Apply**. The Frame Type Entries list box will be updated with the newly created entry.

You can edit an existing frame Type entry by changing its previously assigned priority.

1. Highlight the desired entry in the Current Priority Entries list box, and click on the **Edit** button. The Priorities drop-down list box will be activated (the Frame Type cannot be edited once it is initially configured).
2. Click on the **Priority** drop-down list box, and scroll to select the desired priority level (**Normal–7**) for forwarding packets received with the specified frame Type information.
3. Click the **Apply** button. The Frame Type Priorities Entries list box will be updated with the newly edited entry.

To clear a priority entry from the *ctPriorityExtPktTypeTable*:

1. Highlight the desired entry in the Frame Type Priorities Entries list box, and click on the **Delete** button. The entry fields will be cleared from the table.

The System Resources Window

The System Resources window displays current physical and logical system resources and utilization on your SmartSwitch 2000.

To display the System Resources window:

1. Click on **Device** in the Chassis View menu bar to display the Device menu.
2. Select **System Resources**. The System Resources window, Figure 2-21, opens.

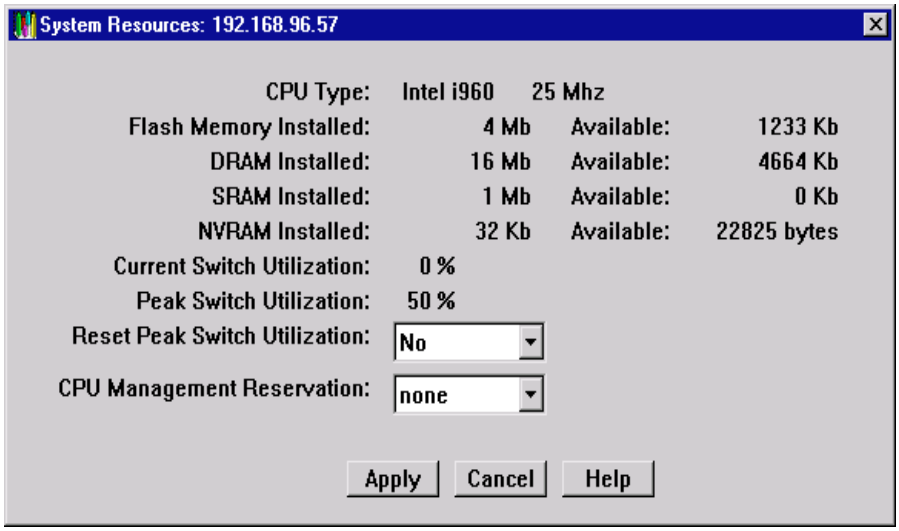


Figure 2-21. The System Resources Window

CPU Type
Displays the type and speed (in mega-hertz) of the CPU (processor) used by the system.

Flash Memory Installed:
Displays the total amount of installed flash memory (in Mbytes).

Flash Memory Available:
Displays (in Kbytes) the current amount of flash memory that is currently free and not currently being used for code and data.

DRAM Installed:
Displays the total installed local memory or (DRAM) in Mbytes.

DRAM Available:
Displays (in Kbytes) the current amount of local memory (DRAM) that is currently free and not currently being used for code and data.

SRAM Installed:
Displays the total amount of shared memory (SRAM) that is installed (in Mbytes).

SRAM Available:
Displays (in Kbytes) the current amount of shared memory (SRAM) that is free and not currently being used for data.

NVRAM Installed:
Displays (in Kbytes) the total installed non-volatile memory (NVRAM).

NVRAM Available:
Displays (in Bytes) the current amount of non-volatile memory (NVRAM) that is free and not currently being used for data.

Current Switch Utilization:
Displays the current load on the switch, which is based on a percentage of maximum switching capacity of 100%.

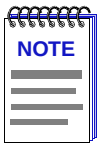
Peak Switch Utilization:
Displays the peak percentage of switch load (based on a maximum of 100%) that has occurred on the switch, since power-up or last reset, along with the time and date that it occurred. This field can be administratively refreshed, as described below.

Reset Peak Switch Utilization:
This option allows you to clear the Peak Switch Utilization field.The Peak Switch Utilization field will immediately display the current switch utilization, and current date and time.

To reset peak switch utilization:

1. Click on  next to the Reset Peak Switch Utilization field and select **Yes** from the drop down list. (The default value is **No**.)
2. Click on the **Apply** button to reset the displayed peak switch utilization. Note that when the window refreshes the value in this field will return to **No**.

   The value displayed as peak switch utilization will be reset to the current value. The time and date will be reset to the current time and date. These values will change only if a peak is experienced after this reset, or if you reset this value again.



*The default setting for this field is **No**. While No is selected the peak switch utilization value will **not** be reset when you click on the **Apply** button. You must choose **Yes** for a reset to take place.*

CPU Management Reservation:
Displays the desired amount of CPU bandwidth reserved for management purposes: none, limited, or full. Bandwidth that is not reserved for management will be devoted to switching.

Reserving CPU Bandwidth

Depending on your needs and the main function of your SmartSwitch 2000 you may wish to change the amount of CPU bandwidth that is currently reserved for management purposes. The three possible allocations of CPU bandwidth on your SmartSwitch 2000 are:

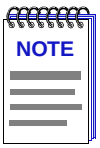
- **none —** the SmartSwitch 2000 will reserve *all* bandwidth for switching; therefore, if all the bandwidth is needed for switching, management frames may be dropped.
- **limited —** the management of the SmartSwitch 2000 may appear slow while the SmartSwitch 2000 is at maximum switching load.
- **full —** management of the SmartSwitch 2000 is *always* possible and management frames will have priority over switched data if full CPU bandwidth is required (switched frames may be dropped).

To configure the CPU Management Reservation:

1. Next to the CPU Management Reservation field click on  and select **none**, **full**, or **limited** from the drop down list.
2. Click on the **Apply** button to set the new CPU management reservation. A window opens stating the set was successful.

802.1Q VLANs

This section introduces and describes pre-standard IEEE 802.1Q port-based Virtual Local Area Network (VLAN) technology and the windows used to configure 802.1Q VLAN-capable devices. SmartSwitch 2000 firmware version 4.00.08 supports the pre-standard IEEE 802.1Q draft specification for port-based VLANs.



For SmartSwitch 2000 firmware versions 4.00.08 and above, HSIM-F6 modules cannot be installed in a SmartSwitch 2000 that is operating in 802.1Q mode.

What is a VLAN?

A Virtual Local Area Network (VLAN) is a logical group of devices that function as a single Local Area Network segment (broadcast domain). Devices comprising a VLAN may be (physically) widely separated, allowing users located in separate areas or connected to separate ports to belong to a single VLAN group. Users assigned to a VLAN can send and receive broadcast and multicast traffic as though they were all physically connected to a single network segment. VLAN-capable switches isolate broadcast and multicast traffic received from VLAN groups, and contain broadcasts and multicasts from members of a VLAN within that group.

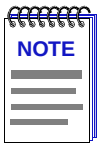
What is an 802.1Q Port-Based VLAN?

Switches that support the pre-standard IEEE 802.1Q draft specification for port-based VLANs act by classifying frames into VLAN membership. Usually, VLAN classification is based on tag headers (VLAN tags) in the headers of data frames. The tag header is inserted into the frame directly after the Source MAC address field. A four-byte field in the tag header is used as the VLAN identifier. These VLAN tags are added to data frames by the switch as the frames are transmitted and/or received by certain ports, and are later used to make forwarding decisions by the switch and other 802.1Q switches. In the absence of a VLAN tag, a frame is assigned VLAN membership according to the VLAN configuration of the switch port that receives the frame.

About 802.1Q VLAN Configuration and Operation

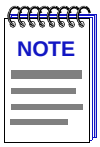
An 802.1Q VLAN is defined by assigning it a unique identification number (the VLAN ID) and an optional name. The VLAN ID is used to identify data frames that originate from, and are intended for, the ports assigned to the VLAN. Up to 64 VLANs may be created, with VLAN IDs ranging from 2-4094. VLAN ID 1 is reserved for the Default VLAN.

Ports on 802.1Q switches are assigned membership in a VLAN by associating a VLAN ID with each port on the switch. The VLAN ID is combined with the port's identification (e.g., device X port X) to form the Port VLAN ID (PVID).



When 802.1Q mode is initially activated on a device, all ports are associated with the Default VLAN (VLAN ID 1). If a VLAN ID has ***not*** *been assigned to a particular port on an 802.1Q switch, any frames received from that port will be classified as belonging to the Default VLAN.*

When 802.1Q is implemented for a SmartSwitch 2000 that has an HSIM-A6DP installed, each LEC will be represented as an individual port which can be easily assigned membership in a VLAN.



For SmartSwitch 2000 firmware version 4.00.08 and above, the number of LECs supported by the HSIM-A6DP in 802.1Q mode is limited to 32.

Once VLANs have been configured and activated, all frames with unknown destination addresses (including broadcast, unknown multicast, and unknown unicast frames) will be contained within the VLAN of their origin. The switch's Filtering Database tracks the associations between MAC addresses, VLAN eligibilities, and port numbers, and is used to make forwarding decisions for frames. All VLANs share a single Spanning Tree.

Ingress List Operation

A port's ingress list specifies the VLAN with which received frames will be associated. The switch's Filtering Database tracks the associations between VLAN eligibilities, MAC addresses, and port numbers.

Untagged frames received by an 802.1Q switch port are classified according to the VLAN membership of the port that receives the frame.

Tagged frames received by an 802.1Q switch port are classified according to the VLAN indicated in their tag header. A port may receive a tagged frame that specifies a VLAN other than the one assigned to the port.

Egress List Operation

Each port's egress list specifies which VLANs are associated with the port, and specifies what type of frame (tagged or untagged) to transmit for each particular VLAN on a port. This information may be statically defined by the user, or dynamically learned and maintained by the switch's Filtering Database.

If a port receives a tagged frame that specifies a VLAN other than the one assigned to the port, the switch will dynamically associate that frame's source address and VLAN with the port (i.e., add that frame's VLAN to the receiving port's egress list). Dynamically learned VLANs are subject to the same aging rules as source addresses (e.g., if a tagged frame belonging to a dynamically learned VLAN is not received by the port within the switch's aging time, the transmitting station's source address and VLAN will be aged out for that port; no unknown destination frames belonging to the station's VLAN will be transmitted through the port until the VLAN is dynamically learned once again). Only tagged frames can cause the switch to dynamically change a port's egress list.

802.1Q Port Types

Each 802.1Q switch port is assigned a mode of operation. Port types include:

1Q Trunk

If VLAN membership is to apply to users across several switches, ports used to connect 802.1Q-aware devices are configured to use 1Q Trunk mode. In this mode, all frames (except BPDUs) are transmitted with a tag header included in the frame, allowing VLAN frames to maintain their VLAN ID across multiple switches. Any untagged frames received by the port are dropped. 1Q Trunk ports are configured to be members of all VLANs.

1d Trunk

This mode allows a port to transmit to a traditional (802.1d) switch fabric. These ports transmit only untagged frames, and the switch expects to receive only untagged traffic through the port. 1d Trunk ports are configured to be members of all VLANs. This mode can be used to share a connection among multiple VLANs (e.g., sharing a server between two or more separate VLANs).

Hybrid
Hybrid mode (enabled by default) allows a port to receive and transmit both tagged and untagged frames. In this mode, the port will be a member of its statically assigned VLAN, as well as any dynamically learned VLANs (remember, dynamically learned VLANs are subject to the same aging rules as source addresses).

Configuring Your 802.1Q VLANS

Before you can define and configure 802.1Q port-based VLANs on your device, you must activate the device's 802.1Q operational mode; this operation can be performed using Local Management or the MIB Tools application. Using MIB Tools, 802.1Q mode can be activated through the Container MIB's Logical Entry Table (*contLogicalEntryTable*). When the 802.1Q component is activated, the device will automatically reset, and begin operating in 802.1Q mode.

Your SmartSwitch 2000 will automatically reset when 802.1Q mode is activated. If you attempt to activate the 802.1Q component via the MIB Tools application, you may lose contact with the rest of the chassis once the device resets. We recommend that Local Management be used to activate 802.1Q mode for SmartSwitch 2000 devices.

Refer to your device's Local Management documentation for instructions on activating a device's 802.1Q operational mode via Local Management. For details on the MIB Tools application, refer to your ***Tools Guide***.

To set up your 802.1Q port-based VLANs using NetSight Element Manager, you must first define the desired VLANs using the VLAN Config window (Figure 2-22), which allows you to assign VLAN IDs and optional VLAN names, and enable or disable VLANs.

After your VLANs are defined, you may configure the ingress and egress lists for each port using the VLAN Port Config window (Figure 2-23) and the VLAN Egress Port Config window (Figure 2-24), respectively.

Setting VLAN Parameters and Operational Modes

802.1Q VLANs are defined using the VLAN Config window, which is accessed from the **Device** menu in your switch's Chassis View. To launch the window:

1. Click on **Device** in the Chassis View menu bar to display the Device menu.
2. Click on **802.1Q VLAN**, and then select **802.1Q VLAN Config**. The VLAN Config window, Figure 2-22, opens.

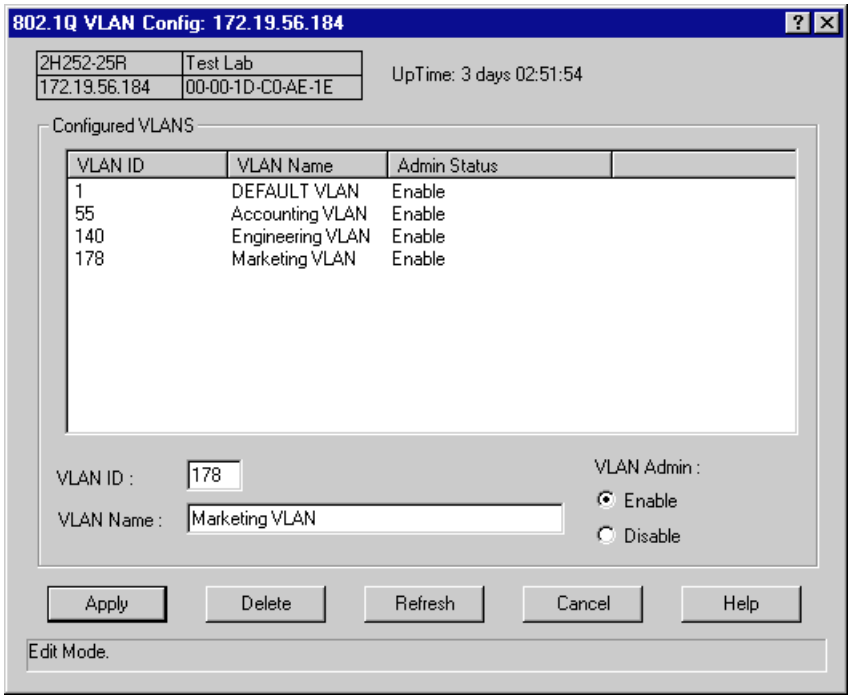


Figure 2-22. The VLAN Config Window

The **Configured VLANS** list box and fields allow you to view, create, modify, delete, enable, and disable 802.1Q port-based VLANs. The list box displays the following information about your defined VLANs:

VLAN ID

The VLAN ID is used to identify data frames that originate from, and are intended for, the ports assigned to the VLAN. Up to 64 VLANs may be created, with VLAN IDs ranging from 2-4094. The VLAN ID is combined with the port's identification (e.g., device X port X) to form the Port VLAN ID (PVID). VLAN ID **1** is reserved for the Default VLAN.

VLAN Name

An optional 32-character VLAN name may be assigned to a created VLAN. The Default VLAN is assigned the name **DEFAULT VLAN**, which cannot be changed or deleted.

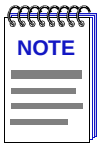
Admin Status

This field indicates whether the VLAN is enabled or disabled. Unless **Enable** is selected when port-based VLANs are initially defined, they are disabled by default. The Default VLAN cannot be disabled.

Creating and Modifying VLANs

The fields immediately below the **Configured VLANS** list box are used to create and modify your port-based VLANs. To create a new VLAN:

1. In the **VLAN ID** field, enter a unique value between **2**-**4094**. VLAN ID **1** is reserved for the Default VLAN, and cannot be used.
2. If desired, enter a name for the VLAN in the **VLAN Name** field. VLAN names must be 32 characters or less.



*Unless **Enable** is selected when a port-based VLAN is initially defined, it will be disabled by default. A new VLAN that is left in a **Disabled** state will remain disabled until a port is assigned to it, at which time it will be automatically enabled. If you are changing a VLAN's port assignment, the VLAN should be disabled before changing the port configuration. See **Enabling and Disabling VLANs**, on page 2-62, for instructions on disabling VLANs. See **Performing Ingress List Configuration**, on page 2-62, for details on completing your VLAN port configuration.*

3. Click **Apply**. The new VLAN will be added to the **Configured VLANS** list box.

Once a VLAN has been created, its VLAN ID cannot be modified. If you wish to change a VLAN's ID, you'll have to delete the VLAN and create a new entry. See **Deleting VLANs**, on page 2-61, for instructions on deleting a VLAN. Attempting to change a VLAN's ID will result in the creation of a new VLAN with the same VLAN name.

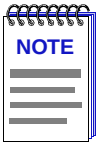
To modify an existing VLAN's name, select its entry in the **Configured VLANS** list box. The selected VLAN's name will be displayed in the **VLAN Name** field. Modify the displayed name as outlined in Steps 2-3, above.

Deleting VLANs

The VLAN Config window also allows you to delete VLANs (except for the Default VLAN, which cannot be deleted). When a VLAN is deleted, any ports assigned to that VLAN will automatically become members of the Default VLAN. To delete a VLAN from your 802.1Q switch:

1. Click to select the desired VLAN entry in the **Configured VLANS** list box.
2. Click **Delete**. The selected VLAN will be removed from the list box.

Enabling and Disabling VLANs



*Unless **Enable** is selected when a VLAN is initially defined, it is disabled by default. A new VLAN that is left in a **Disabled** state will remain disabled until a port is assigned to it, at which time it will be automatically enabled. If you are changing a VLAN's port assignment, the VLAN should be disabled before changing the port configuration. See **Performing Ingress List Configuration**, on page 2-62, for details on completing your VLAN port configuration.*

1. Select the desired VLAN entry in the **Configured VLANS** list box.
2. In the **VLAN Admin** field, click to select **Enable** or **Disable**.
3. Click the **Apply** button. The selected VLAN will be enabled or disabled, depending on your selection.

Updating VLAN Config Window Information

Clicking the **Refresh** button will update the information displayed in the Configured VLANs list without closing the window.

Performing Ingress List Configuration

802.1Q VLAN port assignment and ingress list configuration operations are performed using the VLAN Port Config window, which is accessed from the **Device** menu in your switch's Device View. See **Ingress List Operation**, on page 2-58 for details on ingress lists. To launch the window:

1. Click on **Device** in the Chassis View menu bar to display the Device menu.
2. Click on **802.1Q VLAN**, and then select **802.1Q VLAN Port Config**. The VLAN Port Config window, Figure 2-23, opens.

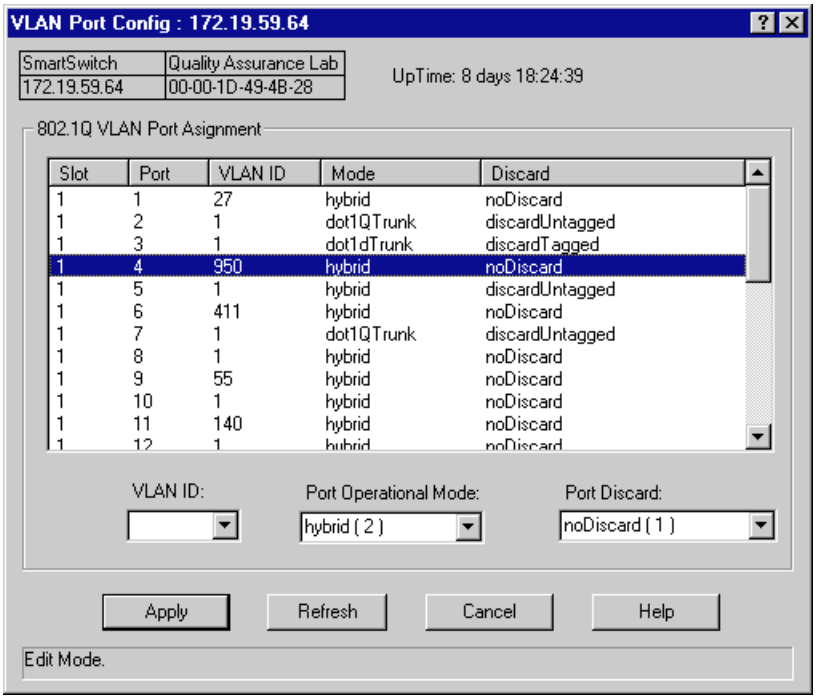


Figure 2-23. The VLAN Port Config Window

The **802.1Q VLAN Port Assignment** list box in this window displays the following information about ports on your 802.1Q switch:

Slot/Port

These fields display the slot and port index for each port on your 802.1Q switch. For the SmartSwitch 2000, the slot index will always be **1**.

VLAN ID

This field displays the VLAN ID of the VLAN to which the port is currently assigned.

Mode

This field displays the port's current mode of operation. Port operational modes include:

- **Dot1DTrunk** mode, which is used for ports that are to connect to a traditional (802.1d) switch fabric. These ports transmit only untagged frames. 1d Trunk ports are configured to be members of all VLANs.
- **Dot1QTrunk** mode, which is used for ports used to connect 802.1Q-aware devices if VLAN membership is to apply to users across several switches. These ports transmit only tagged frames. 1Q Trunk ports are configured to be members of all VLANs.

- **Hybrid** mode, which allows a port to receive and transmit both tagged and untagged frames. In this mode, the port will be a member of its statically assigned VLAN, as well as any dynamically learned VLANs. Hybrid mode is enabled by default.

For more information on 802.1Q port operational modes, see **802.1Q Port Types**, on page 2-58.

Discard
This field displays the port's current frame discard format (**discardTagged**, **discardUntagged**, or **noDiscard**).

The **VLAN ID**, **Port Operational Mode**, and **Port Discard** fields, below the list box, allow you to configure your ports as follows:

VLAN ID
This field allows you to associate a selected port with an existing VLAN. See **Assigning VLAN Membership to Ports**, on page 2-64, for details on performing this operation.

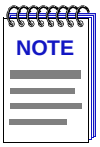
Port Operational Mode
This field allows you to assign a mode of operation to a selected port. See **Setting Port Operational Modes**, on page 2-65, for details on using this field.

Port Discard
This field allows you to specify the frame discard format (discardTagged, discardUntagged, or noDiscard) for a selected port. See **Setting Port Frame Discard Formats**, on page 2-65, for details on using this field.

Assigning VLAN Membership to Ports

To assign a port on your 802.1Q switch to any of your defined VLANs:

1. In the list box, click to select a port that you wish to assign to a VLAN. The port's current VLAN configuration information, including its VLAN ID, will be displayed in the fields below the list box.
2. In the **VLAN ID** field, click to select the VLAN ID of the VLAN to which you wish to assign the selected port.
3. Click the **Apply** button. The new VLAN assignment will be reflected in the VLAN Port Config window's list box for the selected port.



*If you assign a port to a VLAN that is in a **Disabled** state, the VLAN will automatically be **Enabled** once the port assignment operation has been completed.*

Setting Port Operational Modes

To assign a port operational mode (**dot1dTrunk**, **dot1QTrunk**, or **hybrid**) to a port on your 802.1Q switch:

1. In the VLAN Port Config window's list box, click to select a port to which you wish to assign a port operational mode.
2. In the **Port Operational Mode** field, click to select the desired operational mode.
3. Click the **Apply** button. The selected mode will be reflected in the list box for the selected port.

Setting Port Frame Discard Formats

To assign a frame discard format (**discardTagged**, **discardUntagged**, or **noDiscard**) to a port on your 802.1Q switch:

1. In the VLAN Port Config window's list box, click to select a port to which you wish to assign a frame discard format.
2. In the **Port Discard** field, click to select the desired frame discard format.
3. Click the **Apply** button. The selected mode will be reflected in the list box for the selected port.

Updating VLAN Port Config Window Information

Clicking the **Refresh** button will update the information displayed in the 802.1Q VLAN Port Assignment list without closing the window.

Performing Egress List Configuration

802.1Q VLAN switching allows each port on a switch to transmit traffic for any or all defined VLANs on your network. During egress list configuration, you determine which VLANs are on each port's egress list. See **Egress List Operation**, on page 2-58 for details on egress lists.

Egress list configuration operations are performed using the VLAN Egress Port Config window. To launch the window:

1. Click on **Device** in the Chassis View menu bar to display the Device menu.
2. Click **802.1Q VLAN**, and then select **802.1Q VLAN Egress Port Config**. The VLAN Egress Port Config window, Figure 2-24, opens.

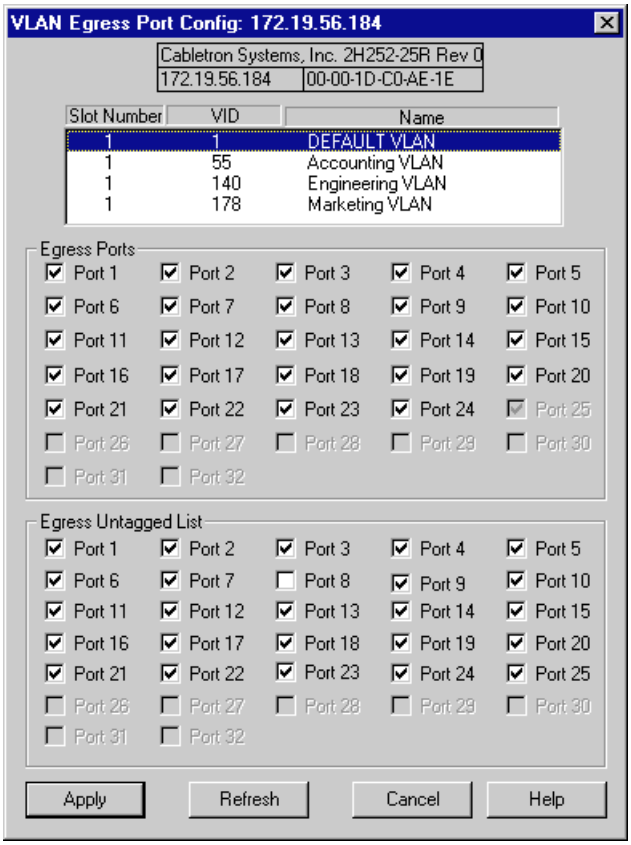


Figure 2-24. The VLAN Egress Port Config Window

The list box at the top of this window is used to select a configured VLAN for association with your switch's ports. Clicking on a VLAN will display its currently associated ports in the lower portion of this window. The list box displays the following information:

Slot Number
This field displays the slot index for the device being configured.

VID
This field lists the VLAN IDs of the currently configured VLANs on your switch.

Name
This field lists the VLAN names assigned to the currently configured VLANs on your switch.

Under the list box there are two groups of check boxes that display the ports on the switch. A checkmark in the port's check box indicates that the VLAN selected in the list box is in the port's egress list. The two groups are:

Egress Ports
Use these check boxes to add or remove the selected VLAN from the egress list of one or more ports.

Egress Untagged List
Use these check boxes to allow the ports to transmit untagged frames from the selected VLAN.

Building an Egress List

1. In the list box at the top of the window, click to select a configured VLAN. The ports that contain the selected VLAN in their egress lists will be displayed in the lower portion of the window with checkmarks in their check boxes.
2. To add or remove the selected VLAN from the egress list of one or more ports, click on the appropriate check box in the **Egress Ports** group. A checkmark in a port's check box indicates that the selected VLAN is in the port's egress list.
3. To add or remove the ability for a port to transmit both tagged *and* untagged frames from the selected VLAN, click to put a checkmark in the appropriate check box in the **Egress Untagged List** group. Note that a port check box in this group will be grayed out until it has been selected in the Egress Ports group.
4. To apply any changes, click on the **Apply** button at the bottom of the window.

Broadcast Suppression

You can monitor and suppress the amount of broadcast frames received on each interface on your SmartSwitch 2000; therefore, protecting your network from broadcast storms. Specifically, you can monitor the number of frames each interface is receiving, and set limits on how many of those broadcast frames will be forwarded to the other interfaces. Once a threshold has been reached on an interface, broadcast frames will be dropped. From the Broadcast Statistics and Suppression window, you can set a unique threshold for each interface on a frames per second basis.

To access the Broadcast Statistics and Suppression window:

1. Click on **Device** in the Chassis View menu bar to display the Device menu.

   or

   Click on the SmartSwitch 2000 module index. The Module Menu opens.

2. Select **Broadcast Suppression**. The Broadcast Statistics and Suppression window, Figure 2-25, opens.

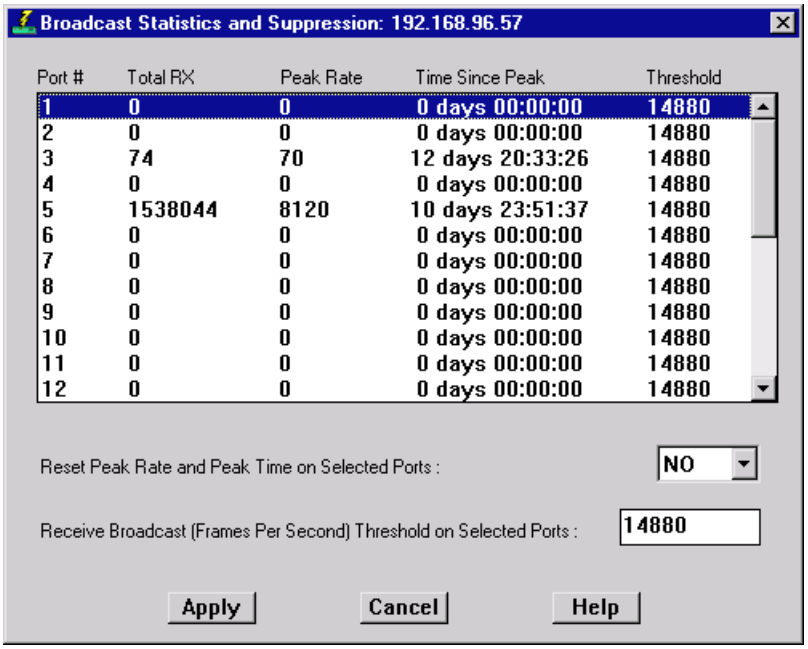


Figure 2-25. The Broadcast Statistics and Suppression Window

Port #
This read-only field indicates the number assigned to each interface on the device.

Total RX
Displays the total number of broadcast frames received on the interface since the device was last initialized.

Peak Rate
The peak rate of broadcast frames (in frames per second) received on the interface since the device was last initialized or the peak value was administratively reset through this window.

Time Since Peak
The time (in a days, hh:mm:ss format) that the peak broadcast rate occurred; that is, the system uptime (MIB-II) at the time the peak occurred. This value will be reset to 0 days, 00:00:00 when the device is re-initialized or when you administratively reset the peak values.

TIP

*In order to calculate the time since peak, subtract the value in the Time Since Peak column from the current **sysUpTime** displayed as Up Time in the front panel. Please note that the peak time you calculate will be within 5 minutes of the actual time since peak, as sysUpTime is polled by default at 3 minute intervals and the broadcast suppression values are polled by default at 2 minute intervals.*

To reset the Peak Rate and Time Since Peak values:

1. Shift-click to select one or more interfaces for which you want to reset the values.
2. Click on the **Reset Peak Rate and Peak Time on Selected Ports:** drop-down list box, and drag to select **YES**.
3. Click on the **Apply** button. The Peak Rate and Time Since Peak values will be reset for the selected interfaces.

Threshold

The maximum number of received broadcast frames that may be forwarded by this interface to other interfaces on the device. Any number of broadcast frames received over this threshold will be dropped. The default value for the interface is near the theoretical maximum frames per second for the interface, i.e., 14,880 for 10Mb Ethernet interface, 148,880 for 100Mb Ethernet or 1,488,800 for Gigabit Ethernet.

To change the Receive Broadcast Threshold:

1. Shift-click to select one or more interfaces for which you want to change the broadcast packet threshold.
2. Highlight the value currently in the **Receive Broadcast Threshold on Selected Ports:** field and type in a new broadcast threshold value. Allowable values begin at 10 and proceed in multiples of ten**.**

NOTE

When you enter a value less than 10, the threshold will default to a value of 0. If you enter a value that is not a multiple of 10 it will round down to the last multiple of 10, i.e., if you enter 15 as the new threshold value, the threshold value will be set to 10; if you enter 49 as the new threshold value, the threshold value will be set to 40.

3. Click on the **Apply** button. The new threshold will be applied to the selected interfaces. Any broadcast frames received by the interface exceeding the set threshold will be dropped.

Setting the Device Date and Time

You can select the **Edit Device Time** and **Edit Device Date** options from the menu to change the date and time stored in the device's internal clock.

To edit the device time:

1. Click on **Device** on the Chassis View window menu bar to access the Device menu. Click **Edit Device Time**.
2. The following change window, Figure 2-26, opens.

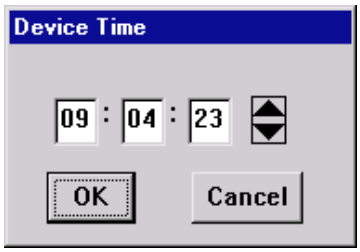


Figure 2-26. The Edit Time Window

3. Enter the new time in a 24-hour hh:mm:ss format, either by highlighting the field you wish to change and using the up and down arrow buttons, or by simply entering the new value in the appropriate field.
4. Click on the **OK** button to save your changes, or on the **Cancel** button to cancel.

To edit the device date:

1. Click on **Device** on the Chassis View window menu bar to access the Device menu. Click **Edit Device Date**.
2. The following change window, Figure 2-27, opens.

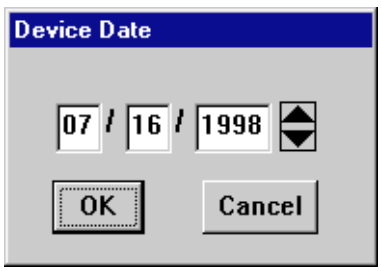


Figure 2-27. The Edit Date Window

3. Enter the new date in a mm/dd/yyyy format, either by highlighting the field you wish to change and using the up and down arrow buttons, or by simply entering the new value in the appropriate field.

4. Click **OK** to save your changes, or on the **Cancel** button to cancel.

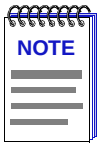
Enabling and Disabling Ports

When you disable bridging at a port, you disconnect that port's network from the bridge entirely. The port does not forward any packets, nor does it participate in Spanning Tree operations. Nodes connected to the network can still communicate with each other, but they can't communicate with the bridge or with other networks connected to the bridge. When you enable a port, the port moves from the Disabled state through the Learning and Listening states to the Forwarding state; bridge port state color codes will change accordingly.

From the Port menus in the SmartSwitch 2000 Chassis View, you can enable and disable any individual ports:

1. Click on the desired Port index. The Port menu displays.

2. Select **Enable** to enable the port, or **Disable** to disable the port. Your port will now be enabled or disabled as desired.



For more information about bridging functions and how to determine the current state of each bridge port, see the ***Bridging*** *chapter in the* **Tools Guide**.

From the Module menu in the SmartSwitch 2000 Chassis View, you can enable or disable bridging at the device level:

1. Click on the **Module Index** in the chassis display. The Module menu opens.

2. Click on **Enable Bridge** to restart bridging at the device level, or **Disable Bridge** to halt bridging across the entire device.

Chapter 3

Alarm Configuration

Accessing the Basic and Advanced Alarms windows; creating a basic alarm; creating an advanced alarm; creating events; assigning actions to events; viewing the event log

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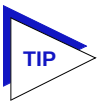
You can configure alarms and events (and, where appropriate, actions) for each available interface through the RMON Alarm and Event functionality supported by your SmartSwitch 2000.



The Alarm, Event, and Actions windows described in this chapter are identical to those provided via the RMON utility. For more information about other features of RMON, see the **RMON User's Guide**.

About RMON Alarms and Events

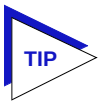
Although Alarms and Events are defined as separate RMON groups, neither one can function properly without the other: you can define an alarm threshold, but if it doesn't point to an event, there will be no indication that the threshold has been crossed; similarly, you can define an event, but unless it is attached to an alarm threshold, it won't be triggered. Each is an essential part of the same notification process: the alarm defines a set of conditions you want to know about, and the event determines the means of letting you know those conditions have occurred.

Events are also an integral part of the filter and packet capture functionality: you can start and stop packet capturing in response to events, or a successful packet capture can generate its own event.

NetSight Element Manager provides two means for configuring RMON alarms: using the Basic Alarms window, you can define both rising and falling alarm thresholds for up to three pre-selected MIB-II variables per interface; based on the options you select, the application automatically creates the necessary events (to log alarm occurrences, generate a trap, or both) and — for devices which support the Actions MIB — adds the requested actions to those events (to enable or disable bridging at the selected interface).

Using the Advanced Alarms feature, you can define custom alarms for almost any MIB-II or RMON object, as long as it is present in the device firmware and its value is defined as an integer (including counters, timeticks, and gauges). All aspects of these alarms are user-selectable: thresholds can be established on either the absolute or delta value for a variable; events can be configured to create a log, generate a trap, or both; and for Enterasys devices that support the Actions MIB, events can also be configured to perform any defined SNMP SET or series of SETs on device objects. The Advanced Alarms feature also allows you to configure any events you wish to use in conjunction with the Packet Capture functionality. (For more information on using the Packet Capture feature, see the ***RMON User's Guide*** included with your software.)

The Basic Alarms feature allows you to assign alarms to any interface type; using the Advanced Alarms feature, you need only be sure to select variables appropriate to the interface — Ethernet for Ethernet, Token Ring for Token Ring, etc. — when defining your alarms.

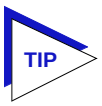


You can use the RMON Alarms feature to configure alarms for MIB objects on FDDI, ATM, and other interfaces that don't specifically support RMON: the Basic Alarms window provides MIB II objects as alarm variables; Advanced Alarm configuration allows you to select any object as an alarm variable, as long as its value is defined as an integer and you assign the correct instance value. See step 5 on page 3-18 and the Note which follows it for more information on assigning the correct instance value to an advanced alarm.

Basic Alarm Configuration

Using the Basic Alarm Configuration application, you can define both rising and falling alarm thresholds for three selected MIB-II objects: *ifInOctets*, *ifInNUcast*, and *ifInErrors*. Because these pre-selected objects are not RMON-specific, you can configure alarms for all interfaces installed in your SmartSwitch 2000 — including those, like FDDI, for which no specific RMON statistics currently exist.

In addition to configuring separate rising and falling thresholds, you can also configure your device's *response* to an alarm condition: when a threshold is crossed, the RMON device can create a log of alarm events, send a trap notifying your management workstation that an alarm condition has occurred, or both; you can even configure an alarm to enable or disable bridging on the offending port in response to a rising or falling alarm condition.



The Basic Alarm Configuration window combines the three parts of creating a working alarm — configuring the alarm itself, configuring an event that will announce the occurrence of an alarm (including assigning any actions), and linking the two — into a single step, and handles the details transparently. For more information about the individual steps involved in creating an alarm, see ***Advanced Alarm Configuration****, on page 3-10.*

Accessing the Basic Alarm Configuration Window

To access the RMON Basic Alarm Configuration window:

1. From the Chassis View, click on the appropriate port interface to display the Port menu.
2. Select **Alarm Configuration**. The RMON Basic Alarm Configuration window, Figure 3-1, opens.

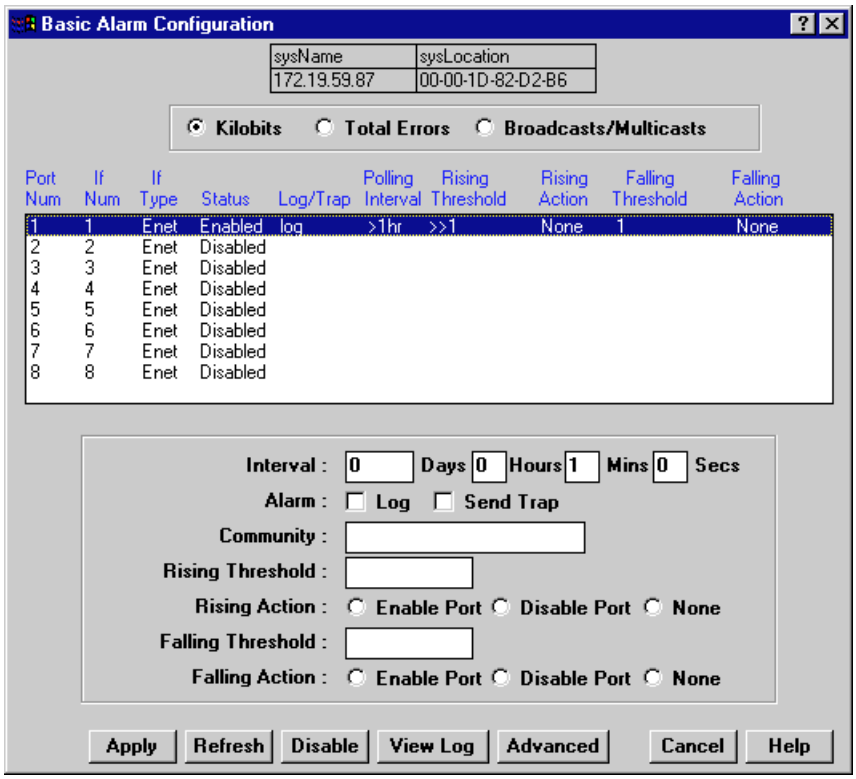


Figure 3-1. The RMON Basic Alarm Configuration Window

TIP

*You can also access the Alarms function — and the rest of the RMON functionality — by selecting the **RMON** option from the Chassis View **Utilities** menu.*

When the window is first launched, no interfaces will be selected, and the **Apply**, **Disable**, and **View Log** buttons will be grayed out: the **Apply** and **Disable** buttons will activate when an interface is selected; the **View Log** button will activate when an interface which has experienced an alarm event is selected. The presence of an event log is indicated by the double greater-than sign (>>) displayed to the left of the threshold value that was crossed.

Viewing Alarm Status

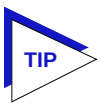
The Basic Alarm Configuration window contains all the fields you need to configure one or more of the three basic alarms available for each interface installed in your RMON device:

Kilobits — Total Errors — Broadcasts/Multicasts

Use these fields at the top of the window to change the alarm type whose status is displayed in the list box. For example, if the **Kilobits** option is selected, the information in the list box pertains to the status of the Kilobits alarm type for each installed interface. Before you configure an alarm or alarms, be sure the appropriate option is selected here.

The available alarm variables are:

- **Kilobits** *(ifInOctets)* — tracks the number of octets of data received by the selected interface. Note that this value has been converted for you from octets (or bytes) to kilobits (or units of 125 bytes); be sure to enter your thresholds accordingly. For example, to set a rising threshold of 1250 octets, enter a threshold value of 10; to set a falling threshold of 625 octets, enter a threshold value of 5.
- **Total Errors** *(ifInErrors)* — tracks the number of error packets received by the selected interface.
- **Broadcast/Multicast** *(ifInNUcast)* — tracks the number of non-unicast — that is, broadcast or multicast — packets received by the selected interface.



The three pre-selected alarm variables are all MIB II variables; this allows you to configure alarms for any installed interface — even those for which no specific RMON statistics exist.

Port Number

Provides a sequential indexing of the interfaces installed in your RMON device.

IF Number

Displays the interface number assigned to each available interface.

IF Type

Displays each interface's type: FDDI, Ethernet, Token Ring, or ATM. Note that there is no type distinction between standard Ethernet and Fast Ethernet.

Status

Displays the current status of the selected alarm type for each interface: Enabled or Disabled. Remember, this status refers only to the alarm type which is selected at the top of the window; each of the other two alarm types can have different states.

Log/Trap
Indicates whether or not each alarm has been configured to create a silent log of event occurrences and the alarms that triggered them, and whether or not each alarm has been configured to issue a trap in response to a rising or falling alarm condition. Possible values are **log**, **trap**, **log&trap**, or **none**.

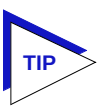
Polling Interval
Displays the amount of time, in days, hours, minutes, and seconds, over which the selected alarm variable will be sampled. At the end of the interval, the sample value will be compared to both the rising and falling thresholds (described below). You can set any interval up to 24,855 days.

Rising Threshold
Displays the high threshold value set for the selected alarm variable. Values used to compare to the thresholds are relative, or **delta** values (the difference between the value counted at the end of the current interval and the value counted at the end of the previous interval); be sure to set your thresholds accordingly.

Rising Action
Indicates whether or not a rising alarm occurrence will initiate any actions in response to the alarm condition: **Enable** if bridging will be enabled at the selected interface in response to a rising alarm, **Disable** if bridging will be disabled at the selected interface in response to a rising alarm, and **None** if no actions have been configured for the selected alarm. Note that the Action fields will be unavailable for devices configured to operate in SecureFast switching mode.

Falling Threshold
Displays the low threshold value set for the selected alarm variable. Values used to compare to the thresholds are relative, or **delta** values (the difference between the value counted at the end of the current interval and the value counted at the end of the previous interval); be sure to set your thresholds accordingly.

Falling Action
Indicates whether or not a falling alarm occurrence will initiate any actions in response to the alarm condition: **Enable** if bridging will be enabled at the selected interface in response to a falling alarm, **Disable** if bridging will be disabled in response to a falling alarm, and **None** if no actions have been configured for the selected alarm. Note that the Action fields will be unavailable for devices configured to operate in SecureFast switching mode.



Before you decide whether or not to assign an action to a rising or falling alarm, it is important to understand something about the hysteresis function built in to the RMON alarm functionality. See ***How Rising and Falling Thresholds Work****, on page 3-27, for more information.*

The remainder of the window fields provide the means for configuring alarms for each available interface. The information provided in this screen is static once it is displayed; for updated information, click on the **Refresh** button. Adding or modifying an alarm automatically updates the list.

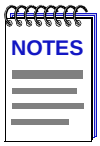
Creating and Editing a Basic Alarm

The editable fields at the bottom of the Basic Alarm Configuration window allow you to configure alarm parameters for each available interface. These fields will display the parameters used for the most recently configured alarm (no matter which interfaces are selected in the list box); this allows you to set the same parameters on multiple interfaces with a single set. Hold down the **Shift** key while clicking to select a contiguous group of interfaces; use the **Ctrl** key to select any interfaces. To display the alarm parameters for a specific interface, double-click on that interface.

There is no specific "Enable" function; simply configuring thresholds and/or actions for an alarm and applying those changes enables the alarm. For more information on disabling an alarm, see **Disabling a Basic Alarm**, on page 3-8.

To configure an alarm:

1. At the top of the window, click to select the variable to be used for your alarm: **Kilobits**, **Total Errors**, or **Broadcast/Multicast**. The display in the list box will reflect the current status at each interface of the alarm type you have selected.
2. In the list box, click to highlight the interface (or use **shift-click** or **ctrl-click** to select multiple interfaces) for which you would like to configure an alarm for the selected variable. Note that the editable fields will display the parameters assigned to the most recently set alarm; however, any changes you make in these fields will be set to *all* selected interfaces.
3. In the **Interval** field, enter the amount of time, in days, hours, minutes, and seconds, over which the selected variable will be sampled. At the end of the interval, the sample value will be compared to both the rising and falling thresholds. You can assign any time interval up to 24,855 days. If you set an incorrect time value (e.g., you enter 75 minutes instead of 1 hour, 15 minutes) you will receive an error message. Click **OK** and enter the correct time value.
4. In the **Alarm** field, click to select one or both of the following options:
   a. Select **Log** if you wish to create a silent log of alarm occurrences.
   b. Select **Trap** if you want your device to issue a trap in response to each alarm occurrence.



In order for the trap selection to work properly, your SmartSwitch 2000 must be configured to send traps to your network management station. This is accomplished via Local Management and the Trap Table; consult your device hardware manual for more information. If you are monitoring a variable you consider to be critical, we do not recommend that you select ***Trap*** *as the only event response; if a trap is lost due to a collision or other transmission problem, it will not be re-sent.*

5. Any value you enter in the **Community** field will be included in any trap messages issued by your SmartSwitch 2000 in response to the alarm(s) you are configuring; this value is also used to direct traps related to this alarm to the appropriate management workstation(s):

   a. **If you enter a value in this field**, traps related to the associated alarms will only be sent to the network management stations in the device's trap table *which have been assigned the same community name* (and for which traps have been enabled). Any IP addresses in the device's trap table which have *not* been assigned the same community string, or which have been assigned no community string, will not receive traps related to the alarm(s) you are configuring.

   b. **If you leave this field blank**, traps related to the associated alarms will be sent to any network management stations which have been added to the device's trap table, and for which traps have been enabled — regardless of whether or not those IP addresses have been assigned a community name in the Trap Table.

6. Click in the **Rising Threshold** field; enter the high threshold value for this alarm. Compared values are always relative, or delta values (the difference between the value counted at the end of the current interval and the value counted at the end of the previous interval); be sure to set your thresholds accordingly.

   When configuring a **Kilobits** alarm, NetSight Element Manager converts octets into kilobits (units of 125 bytes, or octets) for you; for example, to set a rising threshold of 1250 octets, enter a threshold value of 10.

7. In the **Rising Action** field, click to select the action you want your device to take in response to a rising alarm: Enable Port, Disable Port, or None. Note that this action enables and disables only *bridging* at the specified port, and not the interface itself.

   For more information on how actions are triggered, see **How Rising and Falling Thresholds Work**, on page 3-27.

8. Click in the **Falling Threshold** field; enter the low threshold value for this alarm. Remember, compared values are always relative, or delta values (the difference between the value counted at the end of the current interval and the value counted at the end of the previous interval); be sure to set your thresholds accordingly.

When configuring a **Kilobits** alarm, NetSight Element Manager converts octets into kilobits (units of 125 bytes, or octets) for you; for example, to set a falling threshold of 625 octets, enter a threshold value of 5.

9. In the **Falling Action** field, click to select the action you want your device to take in response to a falling alarm: Enable Port, Disable Port, or None. Note that this action enables and disables only *bridging* at the specified port, and not the interface itself.

   For more information on how actions are triggered, see **How Rising and Falling Thresholds Work**, on page 3-27.

Remember, the Actions fields will be grayed out for devices configured to operate in SecureFast switching mode, as there is no active bridging component on those interfaces.

10. Click **Apply** to set your changes. If you have made any errors in configuring alarm parameters (using an invalid rising or falling threshold, for example, or neglecting to supply a polling interval), either an error window with the appropriate message displays, or a beep will sound and the cursor will blink in the field which contains the error. Correct the noted problem(s), and click **Apply** again.

Once you click the **Apply** button, the configured alarm parameters will be set for every selected interface, and the alarms will automatically be enabled; the list box display will also refresh to reflect these changes. To configure additional alarms, or alarms of a different type, select the appropriate alarm variable at the top of the window, highlight the appropriate interface(s), and repeat the procedures outlined above.

Disabling a Basic Alarm

Using the **Disable** button at the bottom of the window actually performs two functions: it both disables the alarm and deletes the alarm entry (and its associated event and action entries) from device memory to help conserve device resources. In the list box display, the parameters for any "disabled" alarm are automatically reset to their default values.

1. In the top of the window, click to select the variable for which you wish to disable an alarm: **Kilobits**, **Total Errors**, or **Broadcast/Multicast**.

2. In the list box display, click to highlight the interface(s) for which you wish to disable the selected alarm type. (Remember, you can use **shift-click** to select a sequential group of interfaces, or **ctrl-click** to select any group of interfaces.)

3. Click **Disable**. The selected alarm type on the selected interface(s) will be disabled, and the list box display will refresh to reflect those changes.

Viewing the Basic Alarm Log

If you have selected the "log" response for an alarm, and that alarm's rising and / or falling threshold has been crossed, the Basic Alarms application will create a log of alarm occurrences. If a threshold has been crossed, it will be preceded in the interface list box display by a double greater-than sign (>>). Clicking to select an interface which is so marked will activate the **View Log** button; selecting the **View Log** button will launch the appropriate Basic Alarm Log, Figure 3-2. (Note that selecting more than one interface — even if all selected interfaces have experienced alarm conditions — will deactivate the **View Log** button; you can only view a single alarm log at a time.)

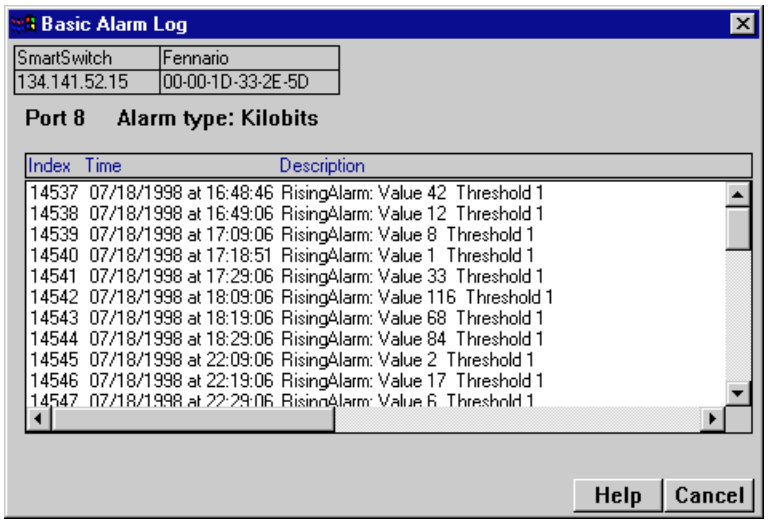


Figure 3-2. Basic Alarm Log

The top portion of the Basic Alarm Log window contains the device information boxes, as well as the Port Number assigned to the interface that experienced the alarm condition and the type of alarm that was triggered; the remainder of the window contains the following information about each alarm occurrence:

Index — This index number uniquely identifies each *occurrence* of a rising or falling event. Note that, since the alarm whose log is displayed in Figure 3-2 experienced both rising and falling alarms, there are two sets of event indices: one which identifies each instance of the rising alarm, and one which identifies each instance of the falling alarm.

TIP

For more information about the relationship between rising and falling alarms and the hysteresis function that controls the generation of alarm events, see ***How Rising and Falling Thresholds Work****, on page 3-27.*

Time — Indicates the date and time of each event occurrence.

Description	Provides a detailed description of the condition which triggered the alarm, including whether it was a Rising or Falling alarm, the Value which triggered the alarm, and the configured Threshold that was crossed.

Each log will hold only a finite number of entries, which is determined by the resources available on the device; when the log is full, the oldest entries will be replaced by new ones.

Advanced Alarm Configuration

The Basic Alarm Configuration window provides a quick and easy way to set up some basic alarms for all of the interfaces installed in your SmartSwitch 2000. However, if you prefer more control over the parameters of the alarms you set (as well as their associated events and actions) and / or a wider array of choices for each variable, the Advanced Alarm feature provides a powerful and flexible means for configuring alarms, events, and actions to suit your particular networking needs.

Accessing the RMON Advanced Alarm/Event List

To access the RMON Advanced Alarm / Event List window:

1. In the Chassis View, click on the appropriate port interface to display the Port menu. Click on **Alarm Configuration**.
2. In the Basic Alarm Configuration window, click on the **Advanced** button; the RMON Advanced Alarm/Event List window, Figure 3-3, opens.

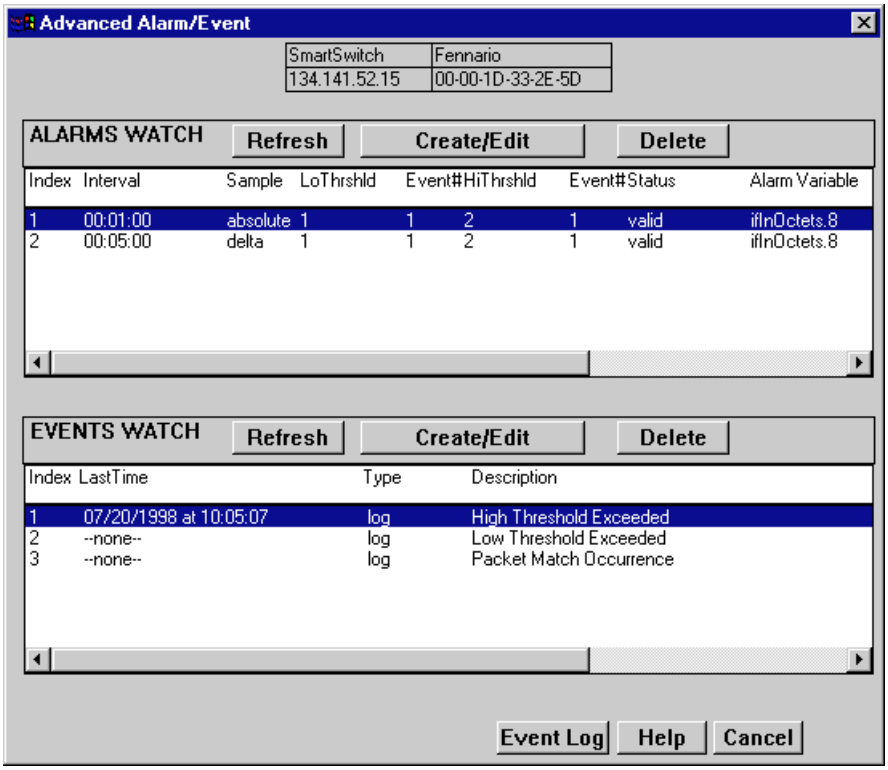


Figure 3-3. The RMON Advanced Alarm / Event List Window

NOTES

Neither the Alarms or Events list is interface-specific; both will be displayed the same for every interface. Alarms and events which have been configured via the Basic Alarms window are not displayed in and cannot be accessed or edited from the Advanced Alarm/Event List window.

The top portion of the window displays the usual device information boxes; the remainder of the window contains the Alarms Watch and Events Watch lists, and the command buttons that allow you to create, edit, and delete entries in those lists, or refresh the display.

The fields in the Alarms Watch display include:

Index	The index is a number that uniquely identifies each alarm. Index numbers are user-defined; you can use any indexing scheme that works for you. These numbers are permanently assigned to their associated alarms; however, index numbers made available by the deletion of existing alarms can be assigned to new alarms, as needed. Indices 2000 to 3999 are reserved and unavailable.
Interval	Indicates the amount of time, in seconds, over which the selected variable will be sampled. At the end of the interval, the sample value is compared to both the rising and falling thresholds configured for the alarm.
Sample	Indicates whether the sample value to be compared to the thresholds is an **absolute**, or total value — that is, the total value counted for the selected variable — or a relative, or **delta** value — the difference between the value counted at the end of the current interval and the value counted at the end of the previous interval.
LoThrshld	Indicates the set value for the low, or falling threshold.
Event #	Indicates the event index number that the falling threshold points to: this is the event that will be triggered if the falling threshold is met or crossed. If the value for this field is zero, no event will be triggered.
HiThrshld	Indicates the set value for the high, or rising threshold.
Event #	Indicates the event index number that the rising threshold points to: the event that will be triggered if the rising threshold is met or crossed. If the value for this field is zero, no event will be triggered.
Status	Indicates the status of the alarm: valid, invalid, or underCreation. An alarm that is invalid is not functional; it may be referring to a MIB component that is inactive (such as the Hosts component), not present, or unreachable, or it may have been deleted by software but not yet removed from memory at the device. An alarm that is underCreation is in the process of being configured (possibly by another management station), and should not be modified until its status is valid; if it never reaches valid status, it will eventually be removed.
Alarm Variable	Indicates the variable that is being watched. You can use the scroll bar, if necessary, to view the complete name.

The information provided in this screen is static once it is displayed; for updated information, click **Refresh**. Adding or modifying an alarm automatically updates the list.

The fields in the Events Watch display include:

Index	This is a number that uniquely identifies an entry in the event table; an index number is assigned when an event is created. These numbers are extremely important, as they are the means by which an event is associated with an alarm or a packet capture filter. As with alarms, these index numbers are user-defined and can be assigned according to any indexing scheme that works for you. Index numbers are permanently assigned to their associated events; however, numbers made available by the deletion of existing events can be assigned to new events, as needed. Indices 2000 to 4999 are reserved and unavailable.
LastTime	Indicates the last time this event was triggered. Note that this information is static once it is displayed, and the LastTime field will not be updated unless you close, then open, the Alarms/Events window, or click **Refresh**.
Type	Indicates the type of response that will be generated if the event is triggered: log, trap, or log & trap. A type of "none" indicates that occurrences of the event will not be logged and no trap will be sent; however, note that this field does not indicate whether or not there are any actions associated with the selected event.
Description	This is a user-defined text description used to identify the event and/or the alarm or packet capture that triggers it.

The **Event Log** button at the bottom of the screen provides access to the log which lists the occurrences of an event.

Creating and Editing an Advanced Alarm

The Create/Edit Alarms window (Figure 3-4, following page) allows you to both create new alarms and edit existing ones. When you click on the **Create/Edit** button in the Alarms Watch list, the Create/Edit Alarms window will display the parameters of the alarm which is currently highlighted in the list. (If no alarms have yet been configured, a set of default parameters will be displayed.) All of these parameters are editable: to change an existing alarm, edit any parameter *except* the Index value; to create an entirely new alarm, simply assign a new Index number. The ability to assign index numbers allows you to quickly and easily create a number of similar alarms without having to close, then re-open the window or re-assign every parameter.

The main Alarm / Event window remains active while the Create / Edit Alarm window is open; to edit a different alarm (or use its settings as the basis of a new alarm), simply double-click on the alarm you want to use in the main Alarms Watch list, and the Create / Edit Alarm window will update accordingly.

To configure an alarm:

1. **If you wish to modify an existing alarm** or create a new alarm based on the parameters of an existing one, be sure the alarm of interest is highlighted in the Alarms Watch list, then click on the **Create/Edit** button at the top of the Alarms Watch portion of the RMON Advanced Alarm/Event List. The Create/Edit Alarms window, Figure 3-4, opens.

   If you wish to create an entirely new alarm, it doesn't matter which existing alarm (if any) is highlighted when you open the Create/Edit Alarms window; although the window will, by default, display the parameters of whichever alarm is currently selected, all parameters are editable and can be configured as desired.

NOTE

Whether you are modifying an existing alarm or creating a new one is determined solely by the assignment of the Index number: if you assign a previously unused index number, a new alarm instance will be created; if you use an existing index number, its associated alarm will be modified.

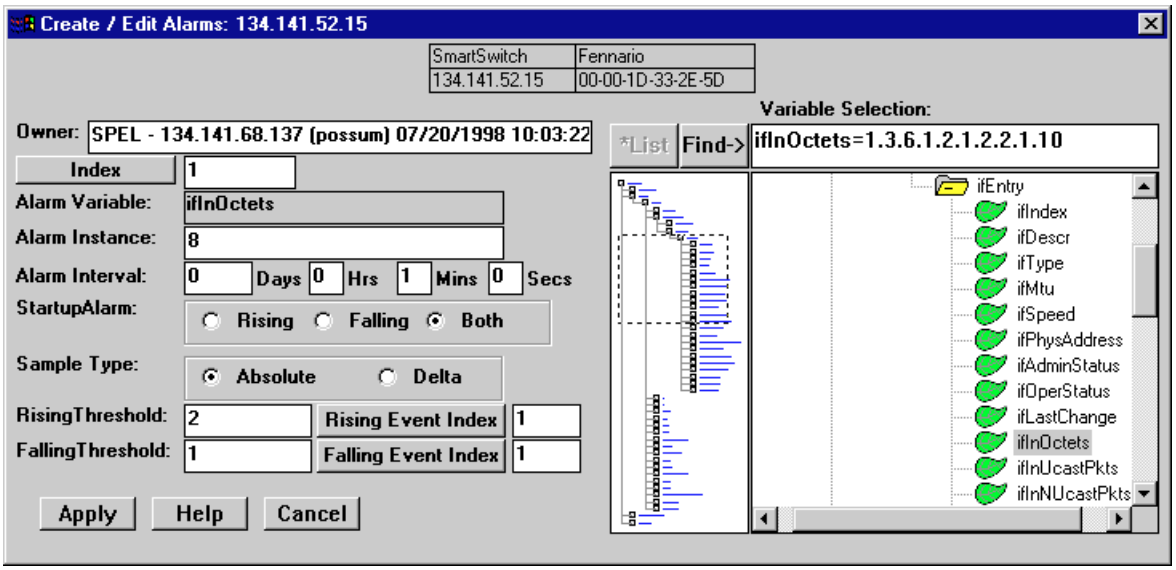
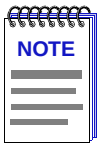


Figure 3-4. The RMON Create / Edit Alarms Window

2. In the **Owner** text box, enter some appropriate text designation for this alarm, if desired; you may want to use the network manager's name or phone number, or the IP or MAC address of the management workstation, to identify

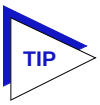
the creator of the alarm. Since any workstation can access and change the alarms you are setting in your SmartSwitch 2000, some owner identification can prevent alarms from being altered or deleted accidentally. The default value provided is — <IP address> <(hostname)> <date> <time>, where <IP address> and <(hostname)> refer to the workstation that created the alarm and <date> and <time> reflect the date and time of the alarm's creation.

3. **If you are creating a new alarm**, use the **Index** field to assign a unique, currently unused index number to identify the alarm. Clicking on the **Index** button will automatically assign the lowest available number; you can also click directly in the text box and assign any value you want between 1 and 1,999 and 4,000 and 9,999 (indices 2000 to 3999 are reserved and unavailable).



*Clicking on the **Index** button to select the next available index number will replace the current Owner string with the default value described above; if the default value is already in place, the date and time will be updated.*

If you wish to modify an existing alarm, enter the appropriate index value, or double-click on the alarm of interest in the Alarms Watch list (in the main Alarm/Event window).



The only thing that determines whether you are modifying an existing alarm or creating a new one is the assignment of the index number; be sure to assign this value appropriately.

4. To select the **Variable** to be used for your alarm, use the MIBTree panel provided on the right side of the window. (For more information about how to use the MIB Tree panel, see the **MIB Tools** chapter in the ***Tools Guide***.) The display will default to the top of the tree (labeled Internet); there are three ways to locate and/or assign the correct variable:

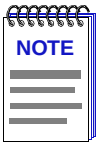
   a. If you know the exact name of the OID whose value you wish to track, simply enter the name in the **Alarm Variable** field; to verify that you have entered the name correctly, click on the **Find->** button to move the MIB Tree display to that OID. (If the MIB Tree display does not adjust to show the OID you've entered, you've entered the name incorrectly.)

   b. Use the Radar View panel located just left of the MIB Tree panel to adjust the MIB Tree display to the part of the tree that contains the variable you are interested in, then click to open the appropriate folders. (Again, see the ***Tools Guide*** for more details on using the Radar View.)

   c. Use the scroll bars and click to open the appropriate folders in the MIB Tree panel to locate the object you wish to use; click to select it in the panel, and its name will automatically be entered in the **Alarm Variable** field.

If you don't know the exact spelling of the OID you wish to use for your alarm variable, and you can't find it by searching through the tree, use the MIB Tool Find feature to locate the OID and determine its exact spelling (and tree location). For more information on the MIB Tool utility and its Find capabilities, see the ***MIB Tools*** *chapter in the* **Tools Guide**. *The Find feature is not case-sensitive.*

Almost any RMON or MIB-II object can be used as an alarm variable as long as it is resident in the device firmware and its value is defined as an integer (including counters, timeticks, and gauges). If you select an invalid object (i.e., one whose value is not an integer), the message "!!Can't set alarm on this type!!" will display in the Alarm Variable field.



If you select an object which is not resident in the device firmware, you will receive a "Set Failed; ensure variable is readable" message when you try to set your alarm by clicking on the ***Apply*** *button. If you are unsure just which objects are resident on your device, and you find yourself receiving a lot of "Set Failed" messages, you can use the MIB Tools utility (accessed from the main console window menu bar or from the Chassis View) to determine which objects are and are not part of your device's firmware — simply query the object you are interested in; if the query response comes back empty, the object is not present (make sure you are using the appropriate community name when making a query, or you will get no response).*

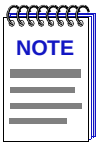
5. Once you have selected the object you wish to use for your alarm variable, you must assign the appropriate instance value in the **Alarm Instance** field. Most RMON objects are instanced by the index number assigned to the table in which they reside; for example, if you wish to set an alarm on an object located in an RMON Statistics table, you can determine the appropriate instance by noting the index number assigned to the table that is collecting data on the interface you're interested in. In the case of the default tables, *index* numbers often mirror *interface* numbers; however, if there are multiple default tables per interface, or if additional tables have been created, this may not be true. (Table index numbers are assigned automatically as table entries are created; no two tables — even those on different interfaces — will share the same table index number.)

   If you have selected an object from a table which is indexed by some other means — for example, by ring number — you must be sure to assign the instance accordingly. If you're not sure how a tabular object is instanced, you can use the MIBTree utility (described in the ***Tools Guide***) to query the object; all available instances for the object will be displayed. (Host and matrix table objects — which are indexed by MAC address — require special handling; see the Note which follows this step.)

   If you have selected an object which is *not* part of a table, you must assign an instance value of 0.

You can use the MIB Tree panel to determine which objects are tabular and which are not: objects which are part of a table will descend from a ***blue*** *folder (which will have a "T" on it, and a name which will almost always include the word "table"); objects which are not will descend directly from a* ***yellow*** *folder. (****Note****: There may be one or more yellow folders in between the blue folder which contains the table and the leaf object you wish to use; however, those objects are still part of the table.)*

Be sure you define your instance values carefully; if you neglect to set the instance correctly, you will receive the "Set failed; ensure variable is readable" error message when you click **Apply** to set your alarm.



If you wish to set an alarm on an object whose instance is non-integral — for example, a Host Table object indexed by MAC address — or on an object with multiple indices, like a Matrix Table entry (which is indexed by a pair of MAC addresses), you must follow certain special procedures for defining the instance. For these OIDs, the instance definition must take the following format:

table index.length(in bytes).instance(in decimal format)

For the first byte of the instance, you must use the index number of the ***table*** *which contains the OID you want to track. For example, to set an alarm on an object in the Host Table, define the first byte of the instance as the index number assigned to the specific Host Table you want to check. These index numbers are assigned automatically as the table entries are created; no two tables — even if they are on different interfaces — will share the same table index number.*

Second, you must specify the length, in bytes, of the index you will be using. Again, in the case of an object in the Host Table, that value would be 6, since Host Table entries are indexed by MAC address — a six-byte value.

Finally, you must specify the index itself, in ***decimal*** *format. In the case of a MAC address, that means you must convert the standard hexadecimal format to decimal format. To do this, simply multiply the first digit of the two-digit hex number by 16, then add the value of the second digit. (For hex values represented by alphabetical characters, remember that a=10, b=11, c=12, d=13, e=14, and f=15.) A hex value of b7, for instance, is represented in decimal format as 16 x 11 + 7, or 183.*

So, for example, the instance for an object in the Hosts group might read as follows:

2.6.0.0.29.170.35.201

where 2=the host table index; 6=the length in bytes of the index to follow; and 0.0.29.170.35.201=the decimal format for MAC address 00-00-1d-aa-23-c9.

For objects with multiple indices — such as objects in a matrix table — you must add additional length and index information to the instance definition, as illustrated below:

3.6.0.0.29.170.35.201.6.0.0.29.10.20.183

where 3=the matrix table index; 6=the length in bytes of the index to follow; 0.0.29.170.35.201=the decimal format for MAC address 00-00-1d-aa-23-c9; 6=the length in bytes of the next index; and 0.0.29.10.20.183=the decimal format for MAC address 00-00-1d-0a-14-b7.

Additional instance issues may exist for FDDI objects; if you're unsure how to assign an instance, use the MIBTree utility to query the object of interest, and note the appropriate instancing on the returned values.

6. In the **Alarm Interval** field, enter the amount of time over which the selected variable will be sampled. At the end of the interval, the sample value will be compared to both the rising and falling thresholds. There is no practical limit to the size of the interval (as the maximum value is 24,855 days 3 hours 14 minutes and 7 seconds — over 68 years!); the default value is 1 minute.

7. Since the first sample taken can be misleading, you can use the selections in the **Startup Alarm** box to disable either the rising or the falling threshold for that sample only. If you would like to exclude the falling alarm, select the **Rising** option; the first sample taken will only generate a rising alarm, even if the sample value is at or below the falling threshold. To exclude the rising alarm, select the **Falling** option; the first sample will then only generate a falling alarm, even if the sample value is at or above the rising threshold. If you wish to receive both alarms as appropriate, select the **Both** option.

8. Use the selections in the **Sample Type** box to indicate whether you want your threshold values compared to the total count for the variable (**Absolute**), or to the difference between the count at the end of the current interval and the count at the end of the previous interval (**Delta**). Make sure you have set your thresholds accordingly.

9. Click in the **Rising Threshold** field; enter the high threshold value for this alarm.

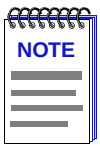
10. There are two ways to assign an event to your rising threshold: click in the **Rising Event Index** text box and enter the number of the event you would like to see triggered if the rising threshold is crossed; or use the Events Watch list in the main Alarm/Event window to highlight the desired event, then click on the **Rising Event Index** button. Be sure you assign the number of a valid event or there will be no response if the selected variable meets or crosses this threshold; assigning an index of zero effectively disables the threshold, as there will be no indication that it has been crossed.

    For more information on how events are triggered, see **How Rising and Falling Thresholds Work**, on page 3-27.

11. Click in the **Falling Threshold** field; enter the low threshold value for this alarm.

12. There are two ways to assign an event to your falling threshold: click in the **Falling Event Index** text box and enter the number of the event you would like to see triggered if the falling threshold is crossed; or use the Events Watch list in the main Alarm/Event window to highlight the desired event, then click on the **Falling Event Index** button. Again, be sure you assign the number of a valid event or there will be no response if the selected variable meets or crosses this threshold; assigning an index of zero effectively disables the threshold, as there will be no indication that it has been crossed.

    For more information on how events are triggered, see **How Rising and Falling Thresholds Work**, on page 3-27.



There is no limit to the number of alarms that may be assigned to the same event.

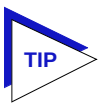
13. Click **Apply** to set your changes. If you have made any errors in configuring alarm parameters (using an invalid value in any field, leaving a field blank, or selecting an alarm variable which is not resident on the device), an error window with the appropriate message displays. Correct the noted problem(s), and click **Apply** again.

The window remains open so that you may configure additional new alarms or modify existing ones; remember, you can double-click on any alarm in the Alarms Watch list in the main Alarm / Event window to display its parameters in the Create / Edit Alarm window. When you have finished configuring your alarms, click **Cancel** to close the window.

Creating and Editing an Event

The Create / Edit Events window (Figure 3-5 on page 3-21) — like the Create / Edit Alarms window — allows you to both create new events and edit existing ones. When you click on the **Create/Edit** button in the Events Watch list, the Create / Edit Events window will display the parameters of the event which is currently highlighted in the list. (If no events have yet been configured, a set of default parameters will be displayed.) All of these parameters are editable: to change an existing event, edit any parameter *except* the Index value; to create an entirely new event, simply assign a new Index number. The ability to assign index numbers allows you to quickly and easily create a number of similar events without having to close, then re-open the window or re-assign every parameter.

The main Alarm / Event window remains active while the Create / Edit Event window is open; to edit a different event (or use its settings as the basis of a new event), simply double-click on the event you want to use in the main Events Watch list, and the Create / Edit Event window will update accordingly.



If the Create/Edit Actions window is also open, it too will update to display the actions associated with the event currently selected in the main Alarm/Event window. See ***Adding Actions to an Event****, on page 3-23, for more information on the actions feature.*

To configure an event:

1. **If you wish to modify an existing event** or create a new event based on the parameters of an existing one, be sure the event of interest is highlighted in the Events Watch list, then click on the **Create/Edit** button at the top of the Events Watch portion of the RMON Advanced Alarm/Event List. The Create/Edit Events window, Figure 3-5, opens.

   If you wish to create an entirely new event, it doesn't matter which existing event (if any) is highlighted when you open the Create/Edit Events window; although the window will, by default, display the parameters of whichever event is currently selected, all parameters are editable and can be configured as desired.

Whether you are modifying an existing event or creating a new one is determined solely by the assignment of the Index number: if you assign a previously unused index number, a new event instance will be created; if you use an existing index number, its associated event will be modified.

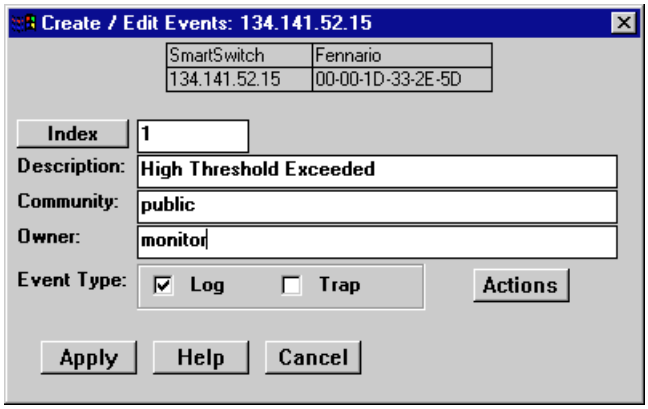


Figure 3-5. The RMON Create / Edit Events Window

2. **If you are creating a new event**, use the **Index** field to assign a unique, currently unused index number to identify the event. Clicking on the **Index** button will automatically assign the lowest available number; you can also click directly in the text box and assign any value you want between 1 and 1,999 and 5,000 and 9,999 (indices 2000 to 4999 are reserved and unavailable).

*Clicking on the **Index** button to select the next available index number will replace the current Owner string with the default value; if the default value is already in place, the date and time will be updated.*

If you wish to modify an existing event, enter the appropriate index value, or double-click on the event of interest in the Events Watch list (in the main Alarm/Event window).

The only thing that determines whether you are modifying an existing event or creating a new one is the assignment of the index number; be sure to assign this value appropriately.

3. Click in the **Description** text box to enter any text description you want to identify the event. This description displays in the Events Watch window and help you distinguish among the events you have configured.

4. Any value you enter in the **Community** field will be included in any trap messages issued by your SmartSwitch 2000 when this event is triggered; this value is also used to direct traps related to this event to the appropriate management workstation(s):

   a. **If you enter a value in this field**, traps related to this event will only be sent to the network management stations in the device's trap table *which have been assigned the same community name* (and for which traps have been enabled). Any IP addresses in the device's trap table which have *not* been assigned the same community string, or which have been assigned no community string, will not receive traps related to the alarm(s) you are configuring.

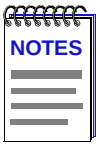
   b. **If you leave this field blank**, traps related to this event will be sent to any network management stations which have been added to the device's trap table, and for which traps have been enabled — regardless of whether or not those IP addresses have been assigned a community name in the Trap Table.

5. You can use the **Owner** text box for administrative or informational purposes; although the text entered here will not appear on any other screens, you may want to use the network manager's name or phone number, or the IP or MAC address of the management workstation, to identify the owner of the event. Since any workstation can access and change the events you are setting in your SmartSwitch 2000, some owner identification can prevent events from being altered or deleted accidentally. The default value provided is **monitor**.

6. Use the options in the **Event Type** field to define how this event will respond when an associated threshold is crossed:

   a. Select the **Log** option to create a silent log of event occurrences and the alarms that triggered them. Each event's log can be viewed by clicking on the **Event Log** button at the bottom of the Alarm/Event window. (See **Viewing an Advanced Alarm Event Log**, on page 3-25, for more information.)

   b. Select **Trap** to instruct the device to send a pair of SNMP traps (one WARNING, one Normal) to the management station each time the event is triggered.



In order for the trap selection to work properly, your SmartSwitch 2000 must be configured to send traps to the management station. This is accomplished via local management; consult your device hardware manual for more information. If you are monitoring a variable you consider to be critical, we do not recommend that you select ***Trap*** *as the only event response; if a trap is lost due to a collision or other transmission problem, it will not be re-sent.*

c. Select both **Log** and **Trap** to both log the event occurrence and generate the traps.

If you select neither option, the event's occurrences will neither be logged nor generate traps; unless the event includes an action or a series of actions, this effectively disables the event (since there will be no indication that it has been triggered).

NOTE

The Event Type field in the Advanced Alarm/Event List window will display a value of "none" if neither the Log nor the Trap response has been selected; note, however, that this field does not indicate whether or not an event has been configured to perform an SNMP SET or series of SETs via the Actions MIB.

7. For devices which support the Cabletron-proprietary Actions MIB, an **Actions** button displays in the Create/Edit Events window; using this feature, you can configure an SNMP SET or series of SETs that will be performed automatically when the event is triggered. See **Adding Actions to an Event**, below, for more information.
8. Click **Apply** to set your changes. The window remains open so that you may configure additional new events or modify existing ones; remember, you can double-click on any event in the Events Watch list in the main Alarm/Event window to display its parameters in the Create/Edit Event window (and in the Create/Edit Actions window, if it's open). When you have finished configuring your events, click **Cancel** to close the window.

Adding Actions to an Event

For devices which support the Cabletron-proprietary Actions MIB, selecting the **Actions** button in the Create/Edit Events window opens the Create/Edit Actions window (Figure 3-6), which allows you to define an SNMP SET or series of SETs that will be performed automatically when the associated event is triggered.

To add an action or actions to an event:

1. In the Create/Edit Events window, click on the **Actions** button. The Create/Edit Actions window, Figure 3-6 (following page), opens.

NOTE

*If no **Actions** button appears in the Create/Edit Events window, the selected RMON device does not support the Actions MIB. For more information about devices which support this MIB, contact the Global Technical Assistance Center.*

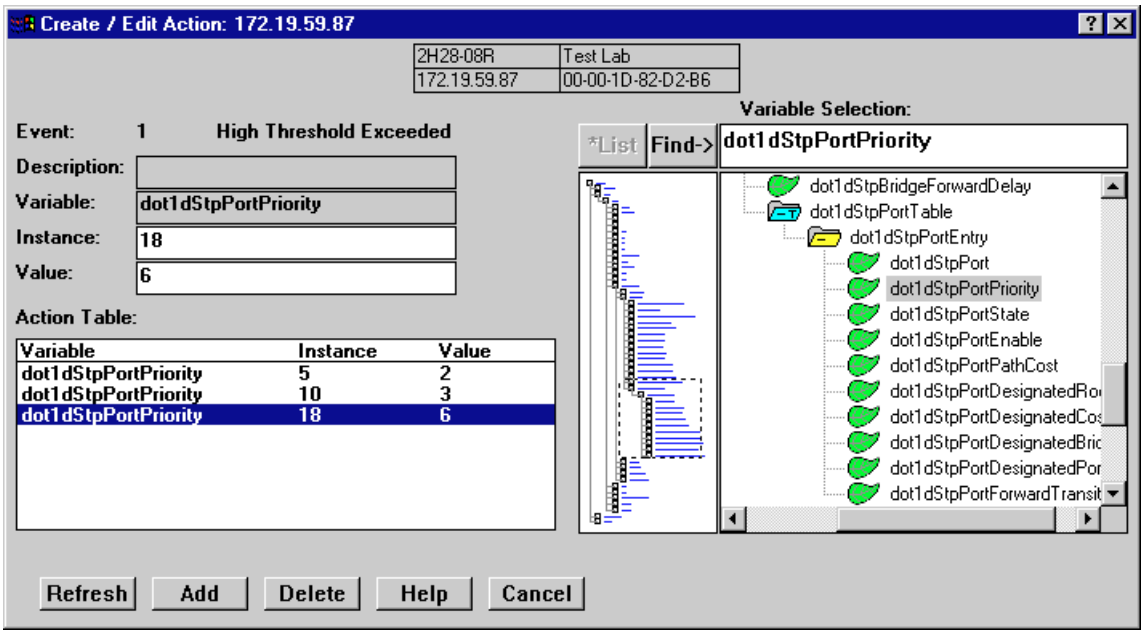


Figure 3-6. The RMON Create / Edit Actions Window

2. The index number and description of the event with which the action or actions will be associated is displayed in the **Event:** field at the top of the window. Information in this field is not editable; to assign actions to a different event, double-click on the correct event in the Events Watch list; both the Create/Edit Events and Create/Edit Actions windows will update accordingly.

3. The **Description** field is not currently editable; future releases of NetSight Element Manager will allow you to assign a descriptive label to each set of actions.

4. To select the **Variable** whose value you wish to SET, use the MIB Tree panel provided on the right side of the window. (For more information about how to use the MIB Tree panel, see the **MIB Tools** chapter in the ***Tools Guide***.) Use the scroll bars and click to open the appropriate folders in the MIB Tree panel to locate the object you wish you use; click to select it in the panel, and its name will automatically be entered in the **Variable** field.

TIP

If you select an invalid OID — that is, one which does not permit write access — the message !!Can't set action on this type!! will be displayed in the Variable field.

If you don't know the exact spelling of the OID you wish to use for your alarm variable, and you can't find it by searching through the tree, use the MIB Tool Find feature to locate the OID and determine its exact spelling (and tree location). For more information on the MIB Tool utility and its Find capabilities, see the ***MIB Tools*** *chapter in the* **Tools Guide**. *The Find feature is not case-sensitive.*

5. Once you have selected the object you wish to set, you must assign the appropriate instance value in the **Instance** field. If you're not sure how the object you wish to set is instanced, you can use the MIB Tree utility (described in the ***Tools Guide***) to query it; all available instances for the object will be displayed.

6. In the **Value** field, enter the value you wish to set for the selected object. Again, if you're not sure what the valid values are for the variable you wish to set, locate the object in the MIBTree utility and use the **Details** button to obtain more information.

7. Once you've configured your action, click **Add** ; the action will be added to the Action Table list in the lower left corner of the window. Note that the window remains open so that you may configure additional new actions or modify existing ones; selecting on any action in the Action Table will display that action's parameters in the window and make them available for editing. When you have finished configuring your actions, click **Cancel** to close the window.

The Action Table will update automatically each time an action is added or deleted; use **Refresh** to update the table at any time.

Deleting an Alarm, Event, or Action

To delete an alarm, event, or action:

1. In the appropriate window, highlight the alarm, event, or action you wish to remove.

2. Click **Delete**. A window opens asking you to confirm your selection; click **OK** to delete, or **Cancel** to cancel.

When you delete an event, be sure you edit all alarms that were pointing to that event, and assign a new valid event to those thresholds; note, too, that deleting an event automatically deletes its associated actions, as actions cannot exist in the absence of an association with an event. As a general rule, we recommend that you do *not* delete an alarm or event of which you are not the owner.

Viewing an Advanced Alarm Event Log

To view the log of occurrences for any event:

1. Highlight the event for which you wish to view the log, then click on the **Event Log** button at the bottom of the Advanced Alarm/Event List window; the Event Log window, Figure 3-7, opens.

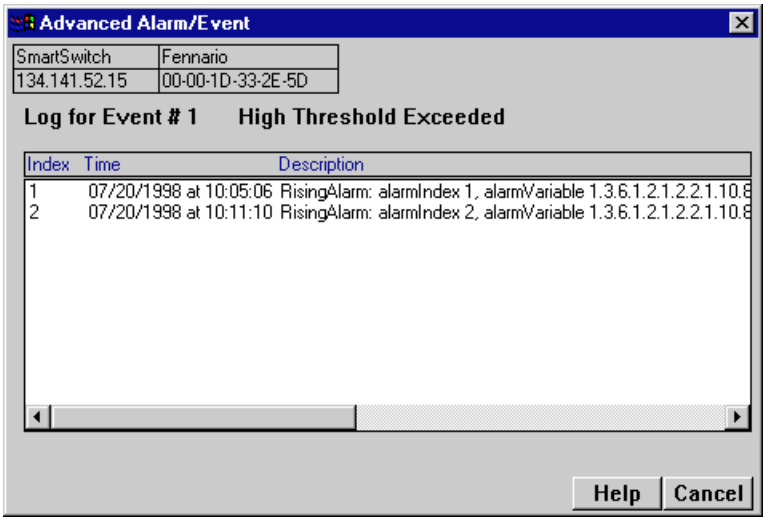


Figure 3-7. The Event Log Window

The top portion of the window contains the device information boxes, as well as the event index number and the event description; the log itself includes the following fields:

Index	This index number is not the ***event's*** index, but a separate index that uniquely identifies this ***occurrence*** of the event.
Time	Indicates the date and time of each event occurrence.
Description	Provides a detailed description of the alarm that triggered the event: whether it was a rising or falling alarm, the alarm index number, the alarm variable name and object identifier (OID), the alarmSampleType (1=absolute value; 2=delta value), the value that triggered the alarm, the configured threshold that was crossed, and the event description. Use the scroll bar at the bottom of the log to view all the information provided.

Each log will hold only a finite number of entries, which is determined by the resources available on the device; when the log is full, the oldest entries will be replaced by new ones.

How Rising and Falling Thresholds Work

Rising and falling thresholds are intended to be used in pairs, and can be used to provide notification of spikes or drops in a monitored value — either of which can indicate a network problem. To make the best use of this powerful feature, however, pairs of thresholds should not be set too far apart, or the alarm notification process may be defeated: a built-in hysteresis function designed to limit the generation of events specifies that, once a configured threshold is met or crossed in one direction, no additional events will be generated until the opposite threshold is met or crossed. Therefore, if your threshold pair spans a wide range of values, and network performance is unstable around either threshold, you will only receive one event in response to what may be several dramatic changes in value. To monitor both ends of a wide range of values, set up two pairs of thresholds: one set at the top end of the range, and one at the bottom.

The current version of the Basic Alarms window only allows you to configure a single pair of thresholds for each alarm variable on each interface; be sure to keep this hysteresis function in mind when configuring those threshold values.

Chapter 4

Statistics

Accessing interface statistics from the Chassis View; available statistics windows

Each port menu in the SmartSwitch 2000 Chassis View provides two statistics selections: **Statistics** and **I/F Statistics**. Selecting the **Statistics** option will launch the highest level of statistics available for the selected interface: if the interface supports RMON, the RMON statistics window will display; if the interface does not support RMON, or if the RMON Default MIB component has been administratively disabled, the MIB-II I/F statistics window will display. Selecting the **I/F Statistics** option will always display MIB-II interface statistics, regardless of the level of RMON support available or the current administrative status of the RMON Default MIB component.

The MIB-II I/F Statistics window is also available for all port interfaces — regardless of their level of RMON support or the current administrative status of the RMON Default MIB component — via the I/F Summary window accessed from the Device menu, and via the I/F Statistics option on the bridge Port menu in the Bridge Status view. For more information about the I/F Summary window, see ***Viewing I/F Summary Information****, on page 2-18 of Chapter 2,* ***The SmartSwitch 2000 Chassis View****; for more information about the Bridge Status view, see the* ***Bridge*** *chapter in the* **Tools Guide**.

Accessing the Statistics Windows

1. Click on the desired port index in the Chassis View window. The Port menu opens.
2. **For RMON statistics** (where available), click to select **Statistics**. The RMON Statistics (Figure 4-1) or MIB-II Interface Statistics (Figure 4-3) window, as appropriate, opens.

   or

   For MIB-II interface statistics, click to select **I/F Statistics**. The MIB-II Interface Statistics window (Figure 4-3) opens.

NOTE

If the selected interface displays MIB-II I/F Statistics and you were expecting to see RMON statistics, the RMON Default MIB component may be disabled; see the **RMON User's Guide** *for information on how to check (and if necessary, change) the admin status of the RMON Default MIB component.*

RMON Statistics

The RMON Ethernet Statistics window (Figure 4-1) provides a detailed statistical breakdown of traffic on the monitored Ethernet network. Statistics are provided in both numerical and graphic format, and include peak values and the date and time they occurred.

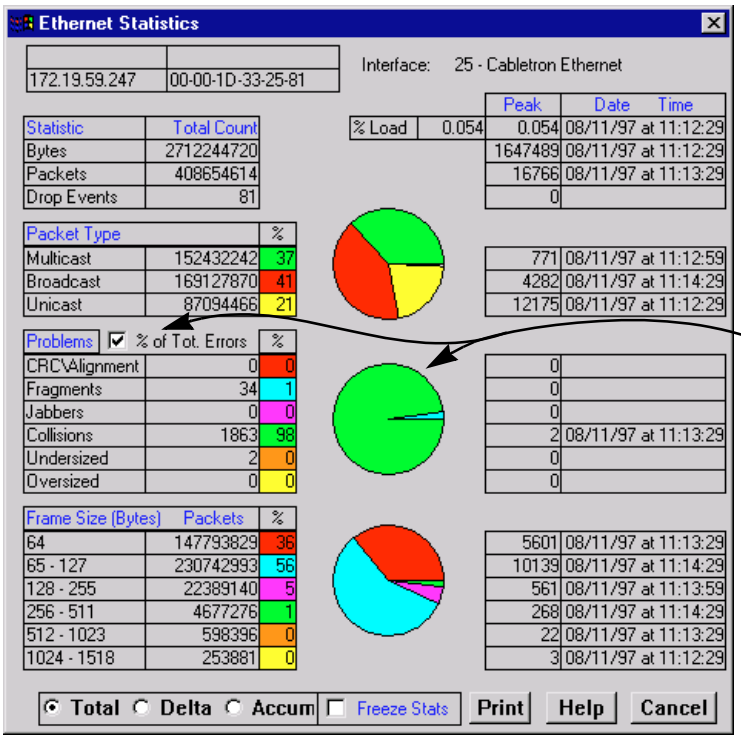


Figure 4-1. The Ethernet Statistics Window

The selected interface number and its description are displayed at the top of the Statistics window. The column on the left side of the window displays each statistic's name, total count, and percentage; the column on the right displays the peak value for each statistic, and the date and time that peak occurred. Note that peak values are always Delta values; see **Viewing Total, Delta, and Accumulated Statistics**, on page 4-5, for more information.

Ethernet statistics are:

Bytes
Displays the total number of bytes contained in packets processed on the network segment. This number includes bytes contained in error packets.

Packets
Displays the total number of packets processed on the network segment. Again, this number includes error packets.

Drop Events
This field indicates the number of times packets were dropped because the device could not keep up with the flow of traffic on the network. Note that this value does not reflect the number of packets dropped, but only the number of times packets were dropped.

% Load
Displays the network segment load during the sample interval, in hundredths of a percent; this percentage reflects the network segment load compared to the theoretical maximum load (10 Mbps) of an Ethernet network.

Packet Type

Multicast	Indicates the number of good packets processed on the network segment that were destined for more than one address. Note that this total does not include broadcast packets.
Broadcast	Indicates the number of good packets processed on the network segment that had the broadcast (FF-FF-FF-FF-FF-FF) destination address.
Unicast	Indicates the number of good packets processed on the network segment that were destined for a single address.

The percentages displayed to the right of the numerical values for these fields indicate what percentage of good packets transmitted on the network segment were multicast, broadcast, and unicast; these percentages will add up to 100. The pie chart in the center of the window provides a graphical view of the percentage breakdown; colors in the pie chart correspond to colors in the percentage display boxes. Values listed to the right of the pie chart indicat peak delta values recorded since the statistics screen was launched, and the date and time they occurred.

Problems

CRC / Alignment	Indicates the number of packets processed by the network segment that had a non-integral number of bytes (alignment error) or a bad frame check sequence (Cyclic Redundancy Check, or CRC error).

Fragments	Indicates the number of packets processed by the network segment that were undersized (less than 64 bytes in length; a runt packet) ***and*** had either a non-integral number of bytes (alignment error) or a bad frame check sequence (CRC error).
Jabbers	Indicates the number of packets processed by the network segment that were oversized (greater than 1518 bytes; a giant packet) ***and*** had either a non-integral number of bytes (alignment error) or a bad frame check sequence (CRC error).
Collisions	Indicates the total number of **receive** (those the device detects while receiving a transmission) and **transmit** (those the device detects while transmitting) collisions detected on the network segment.
Undersized	Indicates the number of packets processed by the network segment that contained fewer than 64 bytes (runt packets) but were otherwise well-formed.
Oversized	Indicates the number of packets processed by the network segment that contained more than 1518 bytes (giant packets) but were otherwise well-formed.

In their default state, the percentages displayed to the right of the numerical values for these fields indicate what percentage of **total packets** transmitted on the network segment were of the noted type. If you select the **% of Tot. Errors** option by clicking the mouse button in the check box, the percentages will indicate what percentage of **problem**, or **error**, **packets** transmitted on the network segment were of the noted type; these percentages will add up to 100. (The **% of Tot. Errors** option is active if there is a check mark in the check box.) The pie chart in the center of the window provides a graphical view of the selected percentage breakdown; colors in the pie chart correspond to colors in the percentage display boxes. Values listed to the right of the pie chart indicate peak delta values recorded since the statistics screen was launched, and the date and time they occurred.

Frame Size (Bytes) Packets

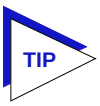
The Frame Size (Bytes) Packets fields indicate the number of packets (including error packets) processed by the network segment that were of the noted length, excluding framing bits but including frame check sequence bits. Packet sizes counted are:

- 64
- 65-127
- 128-255
- 256-511
- 512-1023
- 1024-1518

The percentages displayed to the right of the numerical values for these fields indicate what percentage of all packets transmitted on the network segment were of the noted size. Unless the network segment has experienced a significant number of runts and / or giants (which are not counted in this group), these percentages will add up to 100. The pie chart in the center of the window provides a graphical view of the percentage breakdown; colors in the pie chart correspond to colors in the percentage display boxes. Values listed to the right of the pie chart indicate peak delta values recorded since the statistics screen was launched, and the date and time they occurred.

Viewing Total, Delta, and Accumulated Statistics

By using the **Total**, **Delta**, and **Accum** option buttons located at the bottom of each Statistics window, you can choose whether to view the total statistics count (since the last time the device was initialized), the statistics count during the last polling interval, or a fresh accumulation of statistics begun when the **Accum** button was selected.

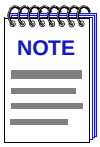


The statistics windows use the polling interval you have set for the monitored device via the Device Properties window. See your **User's Guide** *for more information on setting the polling interval.*

To choose **Total**, **Delta**, or **Accum**:

1. Click on the **Total** option button; after the completion of the current polling cycle plus one complete polling cycle, the screen will display the total count of statistics processed since the entry was created or since the device was last initialized, whichever is most recent. These totals are updated after each polling cycle.
2. Click on the **Delta** option button; after the completion of the current polling cycle plus two more polling cycles, the screen will display the count of statistics processed during the last polling interval. These counts will be refreshed after each polling cycle.
3. Click on the **Accum** option button; after the completion of the current polling cycle plus two more polling cycles, the screen will display a fresh cumulative count of statistics. Note that making this selection does ***not*** clear device counters; you can still re-select **Total** for the total count since the device was last initialized.

Switching the statistics displays among **Total**, **Delta**, and **Accum** does not effect the displayed peak values, as peak values are always **Delta** values.



If you reset your device, you must first close, then re-open the Statistics window to refresh peak values.

To temporarily freeze the statistics display, select the **Freeze Stats** option; in this mode, statistics will continue to be collected, but the display will not update. To resume normal updates, click again to de-select the freeze option.

Printing Statistics

The **Print** button located at the bottom of the Statistics window allows you to print the current snapshot of statistical data. When you select **Print**, a standard Windows print window like the sample shown in Figure 4-2 opens.

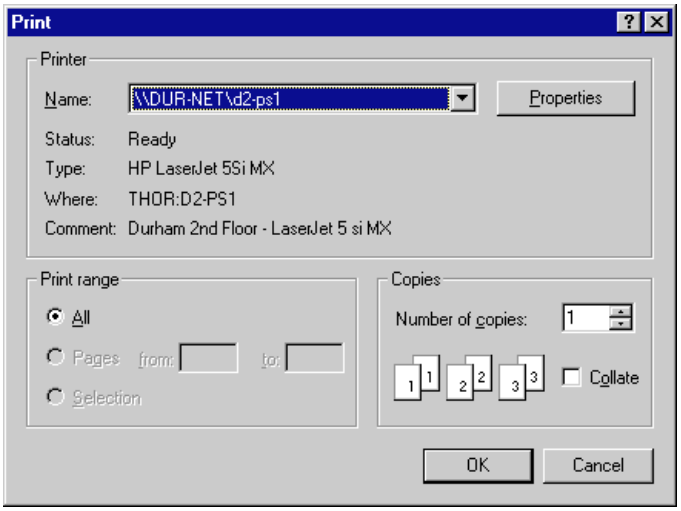


Figure 4-2. Standard Print Window

Adjust printer settings as required, then click the **OK** button.

IF Statistics

The Interface (IF) Statistics window (Figure 4-3) provides MIB-II interface statistical information — including counts for both transmit and receive packets, and error and buffering information — for any port interface on the selected SmartSwitch 2000.

TIP

*The IF Statistcs window can also be launched from the **I/F Statistics** option on the Chassis View port menus; it may also be launched from the **Statistics** option if the selected interface does not support RMON or if the RMON Default MIB component has been administratively disabled. This window is also available for all port interfaces via the I/F Summary window (see **Viewing I/F Summary Information**, on page 2-18 of Chapter 2, **The SmartSwitch 2000 Chassis View**) or the bridge port menus in the Bridge Status view (see the **Bridge** chapter in the* **Tools Guide**).

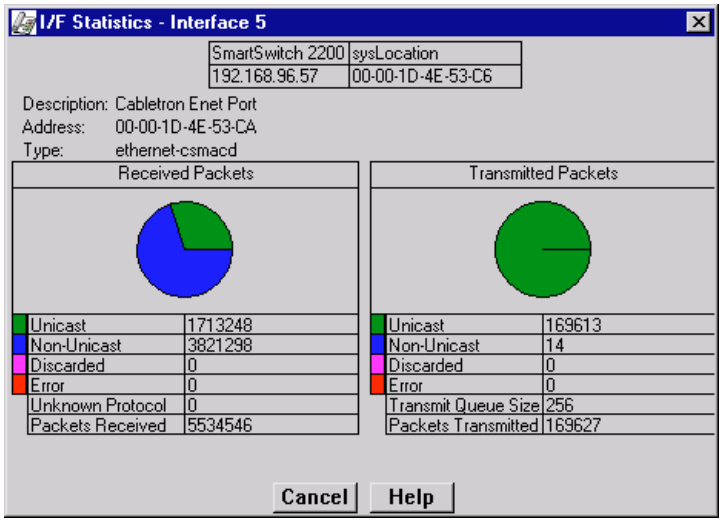


Figure 4-3. The Interface Statistics Window

Three informational fields appear in the upper portion of the window:

Description
Displays the interface description for the currently selected port: Enet Port.

Address
Displays the MAC (physical) address of the selected port.

Type
Displays the interface type of the selected port: ethernet-csmacd, atm, or fddi.

The lower portion of the window provides the following transmit and receive statistics; note that the first four statistics are also graphically displayed in the pie charts.

Unicast
Displays the number of packets transmitted to or received from this interface that had a single, unique destination address. These statistics are displayed in the pie chart, color-coded green.

Non-Unicast
Displays the number of packets transmitted to or received from this interface that had a destination address that is recognized by more than one device on the network segment. The non-unicast field includes a count of broadcast packets — those that are recognized by *all* devices on a segment. These statistics are displayed in the pie chart, color-coded dark blue.

Discarded
Displays the number of packets which were discarded even though they contained no errors that would prevent transmission. Good packets are typically discarded to free up buffer space when the network becomes very busy; if this is occurring routinely, it usually means that network traffic is overwhelming the device. To solve this problem, you may need to re-configure your bridging parameters, or perhaps re-configure your network to add additional bridges.

These statistics are displayed in the pie chart, color-coded magenta.

Error
Displays the number of packets received or transmitted that contained errors. These statistics are displayed in the pie chart, color-coded red.

Unknown Protocol *(Received only)*
Displays the number of packets received which were discarded because they were created under an unknown or unsupported protocol.

Packets Received *(Received only)*
Displays the number of packets received by the selected interface.

Transmit Queue Size *(Transmit only)*
Displays the number of packets currently queued for transmission from this interface. The amount of device memory devoted to buffer space, and the traffic level on the target network, determine how large the output packet queue can grow before the SmartSwitch 2000 will begin to discard packets.

Packets Transmitted *(Transmit only)*
Displays the number of packets transmitted by this interface.

Chapter 5

Managing Ethernet MicroLAN Switches

Viewing the Statistics, Timer Statistics, and Performance Graph windows; using the repeater, board, and port Alarm Limits windows; setting alarm limits; link state traps, segmentation traps, and source address traps

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The Repeater menu lets you access windows to monitor and manage repeated Ethernet networks supported by a SmartSwitch 2000 Ethernet MicroLAN Switch (e.g., the **2E43-51** or **2E43-51R**). Among these windows are repeater, board, and port statistics windows (including Statistics, Timer Statistics, and Performance Graph windows), repeater board, and port Alarm Limits windows, and repeater board, and port Trap Selection windows.

Repeater Statistics

The statistical information collected and stored by your Ethernet MicroLAN Switch provides you with detailed information about how much traffic your network (or a segment thereof) is experiencing, including the sizes and types of packets that make up that traffic, and how much of that traffic comprises packets which have been badly formed or somehow mangled in transmission. These statistics can give you a good overall sense of the usage your network, or network segment, is experiencing.

To help you better understand and track the traffic your network is handling, NetSight Element Manager provides you with a variety of statistical information presented in three different formats: Statistics, Timer Statistics, and Performance Graphs.

Although you can launch most statistics windows from both the Repeater and Module menus, the information provided at both levels will be the same, since each "board" on the Ethernet MicroLAN Switch is equivalent to a repeater channel.

The Statistics Windows

At the Statistics windows, you can view accumulated statistics and error breakdowns for each network supported by the Ethernet MicroLAN Switch, and for each individual module and port. A pie chart graphically depicts these statistics for quick visual reference.

Statistics displayed in these windows include:

- Active Users
- Bytes
- Broadcasts
- Packets
- Collisions (combined Transmit and Receive)
- OOW Collisions
- Giants
- Alignment
- CRC Errors
- Runts

The pie chart to the right of the statistics text boxes lets you graphically view your statistics. The colors in the pie chart correspond to the colors for Packets (**green**), Collisions (**red**), and the two error modes: Hard Errors (**cyan**), and Soft Errors (**yellow**).

Accessing the Statistics Windows

To open the Repeater Statistics window:

1. Click on **Repeater** in the Chassis View menu bar; a menu listing the active repeater channels opens.
2. Select the appropriate repeater channel (A - H) to reveal the Repeater menu.
3. Click on **Statistics**. The Repeater Statistics window, Figure 5-1, opens.

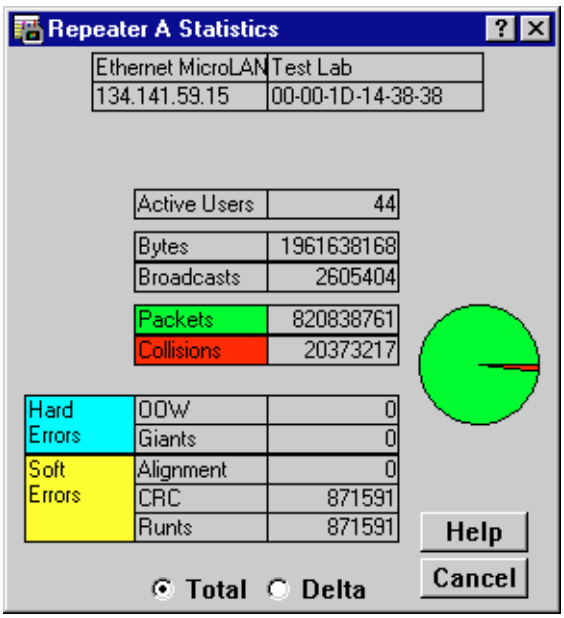


Figure 5-1. The Repeater Statistics Window

To open the board-level Statistics window from the Chassis View window:

1. Click on the appropriate **Module Index** to display the Module menu.
2. Select the appropriate repeater channel (A - H) to reveal the board-level Repeater menu.
3. Click on **Statistics**. The board-level Statistics window opens.

To access the port-level Statistics window:

1. Click on the appropriate **Port** to display the Port menu.
2. Click on **Statistics**. The port-level Statistics window opens.

The Module and Port Statistics windows are the same as the Statistics window displayed in Figure 5-1, except that they display statistics applicable to the module or port.

Statistics Defined

The Statistics window displays the statistical counts accumulated since the Ethernet MicroLAN Module was last reset; the following information is displayed:

Active Users

Displays the number of users (identified by MAC [Ethernet] address) communicating via a port on the Ethernet MicroLAN Module. For an individual port, the number of Active Users can tell you whether the port is supporting a station or trunk connection.

Bytes

Displays the total number of bytes – including error packets – that have been processed by the selected repeater, board, or port. Note that this byte count *includes* errors.

Broadcasts

Displays the total number of broadcast frames that have been processed by the repeater, board, or port. Broadcast packets have a single address recognized by each station on the net; this address is designated in IP address form as 255.255.255.255, or in MAC hexadecimal form as FF-FF-FF-FF-FF-FF. ARP and RARP requests sent by bridges and routers are broadcast messages.

Packets

Displays the total number of packets processed by the repeater, board, or port. Again, note that the packet count *includes* errors.

Collisions

Displays the combined number of transmit and receive collisions detected by the repeater, board, or port. Transmit collisions are those the Ethernet MicroLAN Module detects while transmitting a packet, which means the Ethernet MicroLAN Switch has transmitted one of the colliding packets; receive collisions are those detected by the Ethernet MicroLAN Switch while it is receiving a transmission.

Hard Errors

OOW Collisions	Displays the number of collisions out of the standard collision window (51.2 µs) experienced by the repeater, board, or port. Out-of-window collisions typically indicate a network design flaw.
Giants	Displays the number of giant packets that the repeater, board, or port has detected. A giant packet exceeds the maximum Ethernet frame size of 1518 bytes (excluding the preamble).

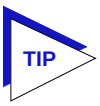
Soft Errors

CRC Errors	Displays the total number of packets with CRC (**C**yclical **R**edundancy **C**heck) errors that the repeater, board, or port has received from the network. CRC errors occur when packets are somehow damaged in transit.
Alignment Errors	Displays the total number of misaligned packets received by the repeater, board, or port. A misaligned packet is one that contains a non-integral number of bytes (that is, any unit of bits less than a byte). Alignment errors are also known as framing errors.
Runts	Displays the number of runt packets that the repeater, board, or port has received from the network. A runt packet is one that is less than the minimum Ethernet frame size of 64 bytes.

Using the Total and Delta Option Buttons

By using the **Total** and **Delta** option buttons located at the bottom of the Statistics windows, you can choose whether to view the total statistics count (**Total**) or the statistics count for the last polling interval (**Delta**).

1. Click on the **Total** option button; after the completion of the current polling cycle plus one complete polling cycle, the window will display the total count of statistics processed since the most recent start-up of the Ethernet MicroLAN Module.
2. Click on the **Delta** option button; after the completion of the current polling cycle plus two more polling cycles, the window will display the count of statistics processed during the last poll interval. These counts will be refreshed after each polling interval.



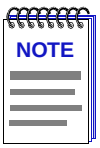
*The statistics windows use the polling interval you have set for the monitored device via the **Device Management** page of the **Options** window, which is launched from the **Tools** menu in the NetSight Element Manager primary window menu bar. See your* **User's Guide** *for more information on setting the Chassis Manager polling interval.*

Timer Statistics

You can use the Timer Statistics windows to gather statistical information concerning the repeater channels on your Ethernet MicroLAN Module and its boards and / or ports over a user-set time period. Statistics are displayed both numerically and graphically, using color-coded, dynamic bar charts. These bar charts display the elapsed, average, and peak values for percent load, percent collisions, and percent errors at the repeater, board, or port level. The values are color-coded as follows:

- **Green** (Elapsed) – Indicates the level of activity during the last time interval.
- **Blue** (Average) – Indicates the average levels of activity over all timer intervals since the window was invoked.
- **Magenta** (Peak) – Indicates the peak level of activity over all time intervals since the window was invoked.

The displayed statistics will automatically update using the time interval you have set; allowable time intervals range from one second to 23 hours / 59 minutes / 59 seconds. You can also refresh the statistics accumulated in the Timer Statistics window at any time by clicking the **Clear** button. This will only reset the counters at the Timer Statistics window; the statistical counts maintained by the device are not affected. The time under the **Clear** button will also update, indicating the last time that the Timer Statistics window was cleared.



*The time interval set in the Timer Statistics window functions independently from the polling interval you have set for the monitored device via the **Device Management** page of the **Options** window.*

Accessing the Timer Statistics Windows

To open the repeater-level Timer Statistics window:

1. Click on **Repeater** in the Chassis View menu bar; a menu listing the active repeater channels opens.
2. Select the appropriate repeater channel (A - H) to reveal the Repeater menu.
3. Click on **Timer Statistics**. The Repeater Timer Statistics window, Figure 5-2, opens.

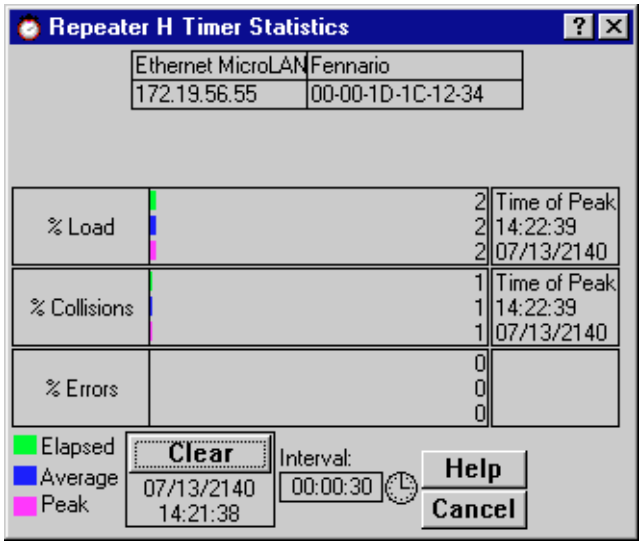


Figure 5-2. The Repeater Timer Statistics Window

To open the board-level Timer Statistics window:

1. Click on the appropriate **Module Index** to display the Module menu.
2. Select the appropriate repeater channel (A - H) to reveal the board-level Repeater menu.
3. Click on **Timer Statistics**. The board-level Timer Statistics window opens.

To access the port-level Timer Statistics window:

1. Click on the appropriate **Port** to display the Port menu.
2. Click on **Timer Statistics**. The port-level Timer Statistics window opens.

The Board and Port Timer Statistics windows are similar to the Repeater Timer Statistics window displayed in Figure 5-2, except that they display statistics applicable to the board or the port.

The Timer Statistics windows display the elapsed, average, and peak values for the following statistics:

% Load
The percentage of total theoretical load processed by the selected repeater, board, or port during the user-defined time interval. For standard Ethernet, the total theoretical load is 10 Mbps.

% Collisions
The percentage of collisions processed by the selected repeater, board, or port during the user-defined time interval.

% Errors
The percentage of errors processed by the selected repeater, board, or port during the user-defined time interval.

Setting the Timer Statistics Interval

To set the Timer Statistics time interval:

1. Click on the clock symbol ( ) next to the **Interval** text box. The New Timer Interval text box, Figure 5-3, opens.

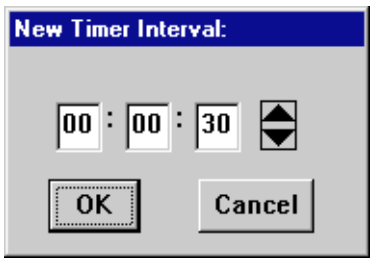


Figure 5-3. New Timer Interval Text Box

2. Highlight the hour field in the New Timer Interval text box and enter a new hour or use the arrow keys to the right of the text box to scroll to change the hour, as desired. The time is given in a 24-hour hh:mm:ss format.
3. Repeat step 2 to change the minutes and seconds fields, as desired.
4. Click **OK** when you are finished entering new information. The new Time Interval you have set is now entered.

The Timer Statistics window will refresh to zero, and the new time interval will take effect immediately.

Repeater Performance Graphs

With the Repeater Performance Graphs, you can use real-time statistics reporting to see at a glance the amount of traffic going through your Ethernet MicroLAN Module at the repeater, board, or port level. These windows provide current statistics both graphically and numerically. The graph has an X axis that indicates the 60 second interval over which charting occurs continuously, while the Y axis measures the number of packets or errors that are processed by the selected repeater, board, or port. The **Detail** buttons brings up an additional window that displays a breakdown of the traffic by error type.

You can select the graphing and statistics parameters by using the command buttons (for Percent Load, Frames, or Errors) and their associated menus. When you alter a parameter, the new parameter displays on the face of the button, and the statistics will refresh to zero activity before regenerating.

Accessing the Performance Graph Windows

To access the repeater-level Performance Graph window:

1. Click on **Repeater** on the Chassis View menu bar; a menu listing active repeater channels opens.
2. Select the appropriate repeater channel (A - H) to reveal the Repeater menu.
3. Click on **Performance Graph**. The Performance Graph window, Figure 5-4, opens.

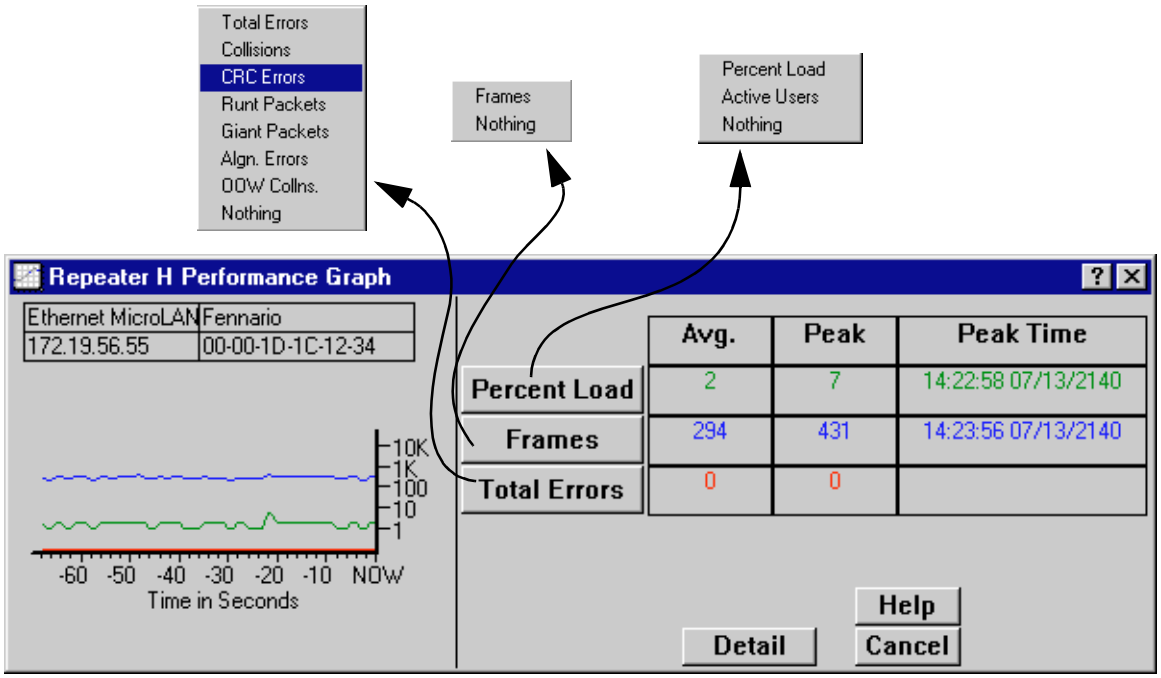


Figure 5-4. The Repeater Performance Graph Window

To access the board-level Performance Graph windows:

1. Click on the appropriate **Module Index** to display the Module menu.
2. Select the appropriate repeater channel (A - H) to reveal the board-level Repeater menu.
3. Click on **Performance Graph**. The board-level Performance Graph window opens.

To access the port-level Performance Graph windows:

1. Click on the appropriate **Port** in the Chassis View display; the Port menu opens.

2. Click on **Performance Graph**. The port-level Performance Graph window opens.

The Board and Port Performance Graph windows are similar to the Repeater Performance Graph window displayed in Figure 5-4, except that they display statistics applicable to the board or port level.

For each chosen statistic, Performance Graphs display both average and peak activity, as well as the date and time the peak values were recorded; average values are also displayed graphically.

The Average statistics are updated every two seconds, as averaged over the previous four two-second intervals; the graphical display also updates at two-second intervals. For the first 60 seconds of graphing, you will note the graph lines extending as each interval's data is added to the graph. Once the first 60 seconds has passed, the newest data is added at the right edge of the graph, and the oldest data is scrolled off to the left.

Each Performance Graph window allows you to graph the following statistical variables:

Percent Load (Green)

Percent Load	Reflects the network load generated by the selected repeater, board, or port, compared to the theoretical maximum load (10 Mbits/s) of an Ethernet network.
Active Users	The number of users transmitting or receiving on the selected repeater, board, or port, as determined by the current number of Ethernet (MAC) addresses stored in each port's Source Address Table.
Nothing	The Percent Load function is not currently measuring any statistics.

Frames (Blue)

Frames	The total number of packets (both good and error) processed by the selected repeater, board, or port.
Nothing	The Frames scale is not currently measuring any statistics.

Total Errors (Red)

Total Errors	The total number of errors of any kind processed by the selected repeater, board, or port.
Collisions	The total number of collisions (combined transmit and receive) detected by the selected repeater, board, or port.
CRC Errors	The total number of packets with CRC (**C**yclical **R**edundancy **C**heck) errors that the selected repeater, board, or port has received from the network.

Runt Packets	The number of runt packets detected by the selected repeater, board, or port. A runt frame is one that is less than the minimum Ethernet frame size of 64 bytes.
Giant Packets	The number of giant packets detected by the selected repeater, board, or port. A giant frame exceeds the maximum Ethernet frame size of 1518 bytes (excluding the preamble).
Algn. Errors	The number of misaligned packets detected by the selected repeater, board, or port. Misaligned packets are those which contain a non-integral number of bytes; they can result from a MAC layer packet formation problem, or from a cabling problem that is corrupting or losing data. Alignment errors are also known as framing errors.
OOW Collns.	The number of collisions out of the standard collision window (51.2 µs) experienced by the selected repeater, board, or port. There are two conditions which can cause this type of error to occur: either the network's physical length exceeds IEEE 802.3 specifications, or a node on the net is transmitting without first listening for carrier sense (and beginning its illegal transmission more than 51.2 µs after the first station began transmitting).
Nothing	The Errors scale is not currently monitoring error packets.

Configuring the Performance Graphs

1. Click on the **Percent Load** button; select the desired Load mode from the menu.
2. Click on the **Frames** button; select the desired Frames mode from the menu.
3. Click on the **Total Errors** button; select the desired Errors mode from the menu.

Once you have selected a new mode, it displays in its respective button, and the Performance Graph and statistics will refresh and begin to measure using the new mode. To stop monitoring and exit the window, click **Cancel**.

The Detail Button

The **Detail** button allows you to view traffic processed by the repeater channel, board, or port according to general frame status (good, errors, or collisions); it also allows you to view errors by type. When you click the **Detail** button, a separate window appears (Figure 5-5) that displays pie charts and statistics for both frame status and error type.

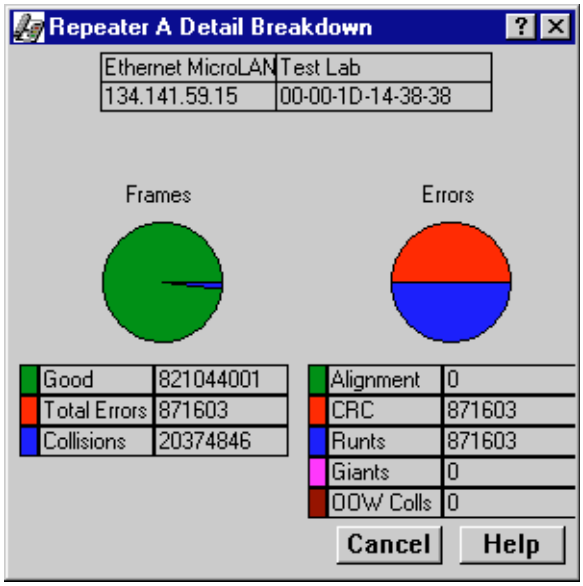


Figure 5-5. Detail Breakdown Window

Frame Status Breakdown

With the Detail Breakdown window, you can see the status of the frames passing through your each repeater channel and each board and port. The status conditions and corresponding colors (for both the pie chart and numerical statistics) are:

- Good (Green)
- Total Errors (Red)
- Collisions (Blue)

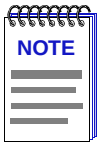
Error Breakdown

The Detail Breakdown window also displays the number of error packets received by a repeater, board, or port. You can view both numerical statistics and a pie chart breakdown for the following errors (note the corresponding colors):

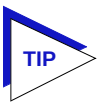
- Alignment (Green)
- CRC (Red)
- Runts (Blue)
- Giants (Magenta)
- OOW Colls (Maroon)

Alarm Limits

Using the Alarm Limits windows, you can configure alarm limits for the Ethernet MicroLAN Switch at the repeater, board, and port levels; these alarms will notify you – via traps sent to NetSight Element Manager's alarm logging facility – that your system has experienced a certain percentage of collisions or errors, or a certain number of specific packet types, within a user-defined time interval. You can also use the board- and port-level Alarms windows to disable a board or port in response to an alarm condition.



In order for your device to issue any traps – and in order for your management workstation to receive those traps – your Ethernet MicroLAN Switch's trap table must have been properly configured via Local Management; see the Ethernet MicroLAN Switch hardware manual for more information.



Although you can access the Alarm Limits window at both the repeater and board levels, note that setting alarms at those two levels will have the same effect, as each Ethernet MicroLAN Switch "board" is equivalent to a repeater channel.

Accessing the Alarm Limits Windows

To open the repeater-level Alarm Limits window from the Chassis View:

1. Click on **Repeater** on the Chassis View menu bar; a menu listing the available repeater channels opens.
2. Select the appropriate repeater channel (A - H) to reveal the Repeater menu.
3. Click on **Alarm Limits**. The Repeater Alarm Limits window, Figure 5-6, opens.

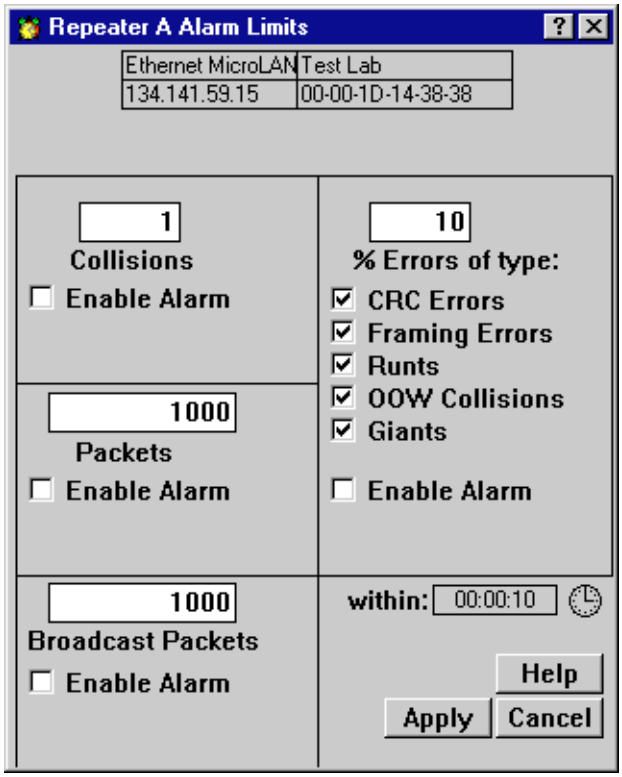


Figure 5-6. The Repeater Alarm Limits Window

To access the board-level Alarm Limits window:

1. Click on the appropriate **Module Index** to display the Module menu.
2. Select the appropriate repeater channel (A - H), then right to reveal the board-level Repeater menu.
3. Click on **Alarm Limits**. The Board Alarm Limits window, Figure 5-7, opens.

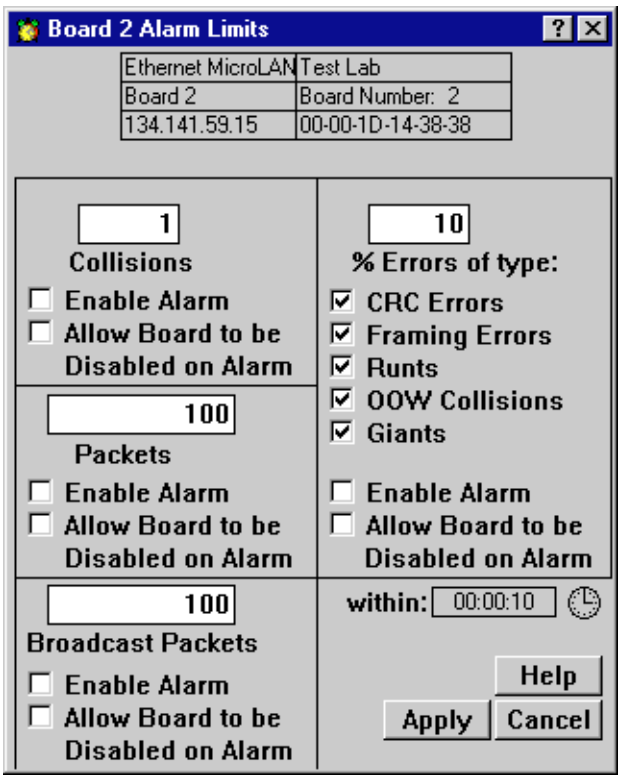


Figure 5-7. The Board Alarm Limits Window

To access the port-level Alarm Limits window:

1. Click once on the appropriate **Port** to display the Port menu.
2. Click on **Alarm Limits**. The Port Alarm Limits window, Figure 5-8, opens.

When using the Alarm Limits screens to set your alarm thresholds, keep in mind that repeater-level thresholds will apply to all traffic received by the selected repeater channel; board-level thresholds will apply only to traffic on the selected board; and port-level thresholds will apply to traffic on the specific port.

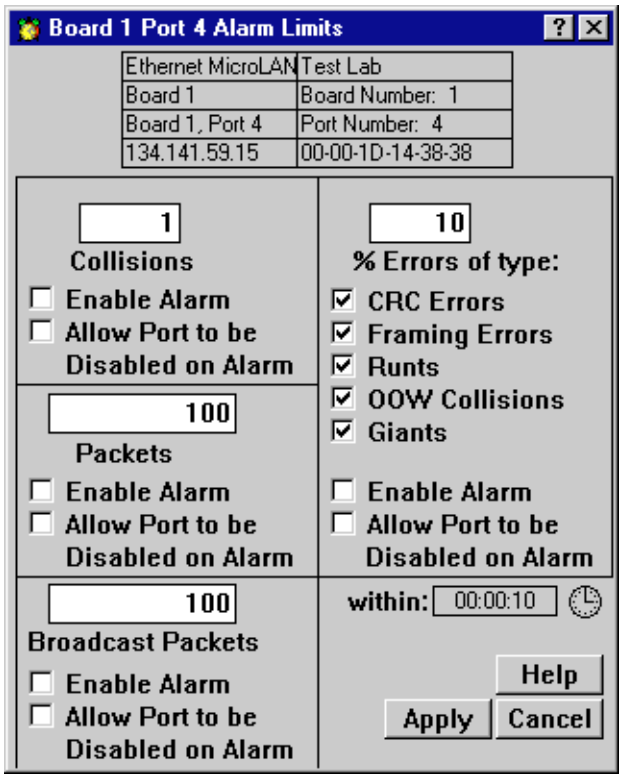


Figure 5-8. Port Alarm Limits Window

The Alarm Limits window displays the following fields:

Collisions

Use the text box in this field to enter the number of collisions per good packet you wish to allow on the selected repeater, board, or port before an alarm is generated; allowable values are 1-15. For example, if you enter a value of 1, the alarm will be generated if the repeater, board, or port experiences an average of one collision per good packet received during the configured time base (see the explanation for "within," below). In terms of percentages, an alarm threshold value of 1 would generate an alarm if 50% of your packets were collisions (one collision for every good packet); a threshold value of 15 would generate an alarm if 93.75% of your packets were collisions (15 collisions for every good packet). Therefore, the lower you set your threshold value, the lower the percentage of collisions per good packet you are allowing.

A repeater- or board-level alarm will calculate the number of collisions per good packet based on all traffic received on the repeater channel; a port-level alarm will make the calculation based on traffic on the specific port only.

Packets

Use the text box in this field to determine the total number of packets (including all errors except collisions) that must be processed by the repeater, board, or port within the user-specified time before an alarm is triggered. Allowable values are 1 to Ý 4 billion (2^{32}-1).

Broadcast Packets

Use the text box in this field to determine the number of broadcast packets that must be processed by the repeater, board, or port within the user-specified time before an alarm limit is reached. Allowable values are 1 to Ý 4 billion (2^{32}-1).

% Errors of Type

Use the text box in this field to determine what percentage of packets received by the repeater, board, or port within the specified time interval can be errors of the selected type or types before an alarm is triggered. Allowable values are one to 100; percentages will be calculated based on the number of error packets of all types selected (all those with an check in their check box). Again, a repeater-level alarm will count all selected error types received by the repeater channel; a port-level alarm will count only selected error types received by the individual port. (Remember, on an Ethernet MicroLAN Switch, a board is equivalent to a repeater channel.)

You can select any combination of the following error types:

CRC Errors	If this check box is selected, all packets with Cyclical Redundancy Check (CRC) errors will be included in calculating the overall percentage of errors.
Framing Errors	If this check box is selected, all misaligned packets will be included in calculating the overall percentage of errors. A misaligned packet is one with a non-integral number of bytes; these are also sometimes referred to as alignment errors.
Runts	If this check box is selected, the number of runt packets will be included in calculating the overall percentage of errors. A runt packet is one that is less than the minimum Ethernet frame size of 64 bytes.
OOW Collisions	If this check box is selected, all collisions out of the standard collision window (51.2 µs) will be included in calculating the overall percentage of errors. Out-of-window collisions are typically caused by faulty network design.
Giants	If this check box is selected, the number of giant packets will be included in calculating the overall percentage of errors. A giant packet exceeds the maximum Ethernet frame size of 1518 bytes (excluding the preamble).

within:
This field displays the user-configurable alarm limit timer interval: the amount of time the selected statistics will be counted before being compared to the configured thresholds. The allowable values range from 10 seconds to 23 hrs / 59 mins / 59 secs.

Configuring Alarms

You configure alarms by choosing the alarm you wish to enable, setting the threshold to the desired level, and selecting a time interval within which that threshold must occur. You can base the alarms on:

- Number of collisions per good packet
- Number of total packets
- Number of broadcast packets
- Percentage of error packets

You can also configure board or port alarm limits so that the board or port will be disabled when an alarm limit is reached.

Setting the Alarm Limits Time Interval

To set the time interval within which the defined alarm thresholds must be reached in order to trigger an alarm:

1. Click on the clock symbol next to the **within:** text box in any one of the alarm limits windows; the interval you set applies to all configured alarms at all levels. The Alarm Interval window, Figure 5-9, opens.

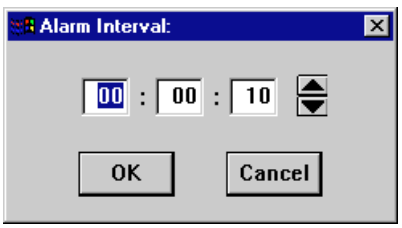


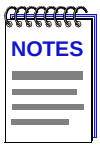
Figure 5-9. The Alarm Interval Window

2. Highlight the **hour** text box and enter a new hour time interval or click the up and down arrows to change the time.
3. Repeat step 2 to set the minutes and seconds of your new time interval. Valid settings range from 10 seconds to 23 hours 59 minutes 59 seconds.
4. Click **OK**. The new Alarm Interval you have set opens in the **within:** text box.
5. Click **Apply** at the bottom of the Alarm Limits window to save your changes, then click on the **Cancel** button to close the window.

Setting Alarm Limits

To set repeater-, board-, or port-level alarms, first be sure you have opened the appropriate Alarm Limits window, then follow the steps outlined below:

1. Using the mouse, click and drag to highlight the text box in the alarm field you wish to configure (**Collisions**, **Packets**, **Broadcast Packets**, or **% Errors**).
2. Enter the desired threshold value, being sure to keep in mind the units and range limits described above.
3. Click on the **Enable Alarm** check box to activate it. (A check box is activated if there is an check in it.)
4. For board- or port-level alarms only, click on the **Allow Board/Port to be Disabled on Alarm** check box if you wish to disable the board or port when an alarm condition occurs.



*If you activate the **Allow Board/Port to be Disabled on Alarm** option, you will have to manually re-enable the board(s) or port(s) if the alarm is triggered. Resetting the device will clear the condition by clearing all packet counters, but you will still need to re-enable the board(s) and/or port(s). On an Ethernet MicroLAN Switch, a board is equivalent to a repeater channel; use care when selecting the **Allow Board to be Disabled on Alarm** option.*

5. Repeat steps 1-4 for each type of alarm you wish to configure.
6. Click on the **Apply** button to save the configuration, then click the **Cancel** button to close the window. Be sure to click on the **Apply** button before closing the window, or your changes will not be saved.

Your Alarm Limits are now set. Any condition that exceeds these alarm limits will generate an alarm, and disable that board or port, if so configured. Refer to the ***Alarm and Event Handling Guide*** for information on how to use the alarm logging facilities to view alarms.

Trap Selection

Cabletron and Enterasys devices are designed to generate traps which indicate when a repeater port gains or loses a link signal (Link State Traps); when the repeater segments (disconnects) a port due to collision activity, and when a segmented port becomes active again (Segmentation Traps); and several traps that result from changes in a port's Source Address Table (Source Address Traps). In some networks, these traps may impart more information than a network manager wants to see. With the Trap Selection option available from the Repeater, Board, and Port menus, you can selectively enable and disable these traps.

Any traps issued by the Ethernet MicroLAN Switch displays in NetSight Element Manager's alarm logging facility. (Refer to your ***Alarm and Event Handling Guide*** for more details.)

NOTE

In order for your device to issue any traps – and in order for your management workstation to receive those traps – your Ethernet MicroLAN Switch's trap table must have been properly configured via Local Management; see the Ethernet MicroLAN Switch hardware manual or Local Management documentation for more information.

Accessing the Trap Selection Windows

To open the repeater-level Trap Selection window from the Chassis View:

1. Click on **Repeater** on the Chassis View menu bar. Select the appropriate repeater to reveal the Repeater menu.
2. Click on **Trap Selection**. The Repeater Trap Selection window, Figure 5-6, opens.

At the repeater or board level, a three-state check box indicates the state of settings for all ports that are on the repeated network. The check box will be:

***Grayed** – If individual port-level settings have mixed enabled and disabled states for a given trap.*

***Checked** – If all port trap settings are enabled for a given trap.*

***Blank** – if all port trap settings are disabled for a given trap.*

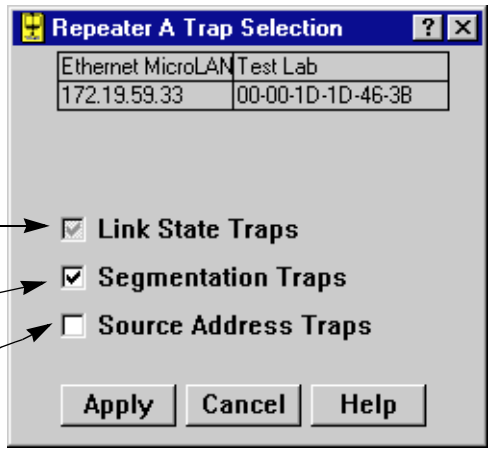


Figure 5-10. Repeater Trap Selection Window

To access the board-level Trap Selection window:

1. Click on the appropriate **Module Index** to display the Module menu.
2. Select the appropriate repeater channel (A - H) to reveal the board-level Repeater menu.
3. Click on **Trap Selection**. The Board Trap Selection window opens.

To access the port-level Trap Selection window:

1. Click on the appropriate **Port** index to display the Port menu.
2. Click on **Trap Selection**. The Port Trap Selection window opens.

The Board Trap Selection window is similar to the Repeater Trap Selection window displayed in Figure 5-10, and serves the same function (since, for the Ethernet MicroLAN Switch, a "board" is the equivalent of a repeater channel). If all port-level trap settings are uniform at the current level of device management (i.e., a given trap is either set to enabled or disabled for *all* ports on a repeated network segment), the check box for a given trap will return with an enabled or disabled state, as appropriate. If port-level trap settings are mixed at the current level of management (i.e., a given trap is enabled at some ports and disabled at other ports on the selected repeater channel), the check box for a given trap will be grayed, as illustrated above for Link State traps.

When you are changing trap settings at the Repeater or Board level, a check box that is left gray for a given trap is treated as a "No SET" indicator, so that the current settings at the individual port level with respect to that trap will *not* be overridden when you are changing other trap settings.

The Port Trap Selection window is similar to the other Trap Selection windows; however the gray mixed-mode will never appear when you first open the window (since at the port-level, a given trap can only be either enabled or disabled – not some combination of the two).

You can change trap settings from any level window; however, if you have established individual trap settings for any ports, remember that enabling and disabling traps from the repeater- or module-level windows will override those individual setting. Remember, too, that setting trap selection state at the repeater and module levels accomplishes the same thing, as each "board" on the Ethernet MicroLAN Switch is a repeated network.

Trap Definitions

You can enable or disable the following kinds of traps:

Link State Traps

Some Ethernet repeater ports – including RJ45 twisted pair and fiber optic ports – generate a link signal to monitor the status of their connection with the device at the other end of the cable segment. If the cable is removed or broken, the port's link status goes to "No Link" and the repeater generates a **portLinkDown** trap. When a port in a "No Link" condition receives a link signal, the port goes to a "Link" condition and the repeater generates a **portLinkUp** trap. Devices at both ends of the disconnected or broken cable will generate the **portLinkDown** and **portLinkUp** traps, even when only one end of the cable has been removed.

Note that BNC (thin coax), AUI, and transceiver ports do not support a link signal. BNC ports respond to changes in link status by generating **portSegmenting** and **portUnsegmenting** traps (see description, below); AUI and transceiver ports do not respond at all to changes in link status (unless the port has been segmented due to excessive collisions), and will always display as on, even if no cable is connected.

Information included in a Link State trap will include the board number and port number associated with the trap.

Segmentation Traps

Ethernet repeaters count collisions at each port. If a port experiences 32 consecutive collisions, or if the port's collision detector is on for more than 2-3 µs, the repeater segments the port to isolate the source of the collisions from the rest of the network. When the repeater segments a port, it generates a **portSegmenting** trap. As soon as a segmented port receives a good packet, the repeater reconnects the port to the network and generates a **portUnsegmenting** trap.

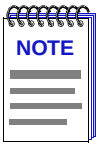
Because they do not support the Link signal, unterminated BNC (thin coax) ports appear as segmented. When you attach a thin coax cable or a terminator to a port, the repeater generates a **portUnsegmenting** trap; when you remove the cable or terminator, the repeater generates a **portSegmenting trap**. As mentioned above, these traps can serve as notification of changes in link status. Note, too, that devices at both ends of the cable segment will generate the **portSegmenting** and **portUnsegmenting** traps, even if only one end of the cable has been disconnected.

Information included in a Segmentation trap will include the board number and port number associated with the trap.

Source Address Traps

The Ethernet MicroLAN Switch can issue several different traps in response to changes in a port's Source Address Table:

A **newSourceAddress** trap is generated when a station port – one receiving packets from no source addresses, or from one or two source addresses – receives a packet from a source address that is not currently in its source address table. Information included in this trap includes the module number, port number, and source address associated with the trap. Trunk ports – those receiving packets from three or more source addresses – will not issue newSourceAddress traps.



Some older repeater devices, and devices with older versions of firmware may include a slightly different definition of station and trunk status: station ports are defined as those receiving packets from zero or one source addresses; trunk ports are defined as those receiving packets from two or more source addresses. If you have any questions about whether your device or firmware version falls into this older category, or if you would like information about upgrading your device firmware, contact the Global Technical Assistance Center.

A **sourceAddressTimeout** trap is issued anytime a source address is aged out of the Source Address Table due to inactivity. The trap's interesting information includes the module and port index, and the source address that timed out.

PortTypeChanged traps are issued when a port's topology status changes from station to trunk, or vice versa. The interesting information includes the module and port index, and the port's new topology status.

A **lockStatusChanged** trap is generated when the ports in the hub are locked or unlocked using the Lock / Unlock Ports option on the Repeater menus; the interesting information is the new lock status.

PortSecurityViolation and **portViolationReset** traps are sent in response to changes related to port locking: if ports are locked, the **portSecurityViolation** trap indicates that a new source address has attempted access on one of the ports, and the ports are being shut down in response; the interesting information is the module and port index, and the violating address. **PortViolationReset** traps are sent when management intervention has re-enabled a port or ports previously disabled in response to a port security violation; the interesting information is module and port index.

Configuring Traps

The current status (enabled or disabled) for Link State, Segmentation, and Source Address traps will always be displayed in the port-level Trap Selection window. The repeater- and board-level windows will display current settings if they are uniform; where settings are not uniform at the selected level, the corresponding check box will be gray.

When you configure traps, keep in mind the hierarchy of levels at which you are setting traps; for the Ethernet MicroLAN Switch, traps set at the repeater or board level will override current port-level settings for all ports on that repeater channel.

When you are setting repeater- or module-level traps, we recommend that you leave the gray "No SET" status untouched (especially for Source Addressing Traps) unless you are ***sure*** *you want to override port-level settings. With no incoming traps to inform you of a port security violation, you may have ports that are disabled on your device for no obvious reason.*

To enable or disable the above-described traps:

1. Open the appropriate Trap Selection window.
2. Click on the **check box** next to the desired trap: **Link State**, **Segmentation**, or **Source Address**.

   An empty check box indicates that the corresponding trap is **disabled**;

   A checked box indicates that the corresponding trap is **enabled**;

   A check box that remains gray indicates that the associated trap will *not* be set (to either enabled or disabled), and the current mode of mixed settings at the port level will be maintained.

3. Click **Apply**. The device will now issue, or stop issuing, the indicated traps to your management workstation. Keep in mind, however, that no traps will be issued to your management station unless the Ethernet MicroLAN Switch's trap table has been properly configured via Local Management. Consult your Local Management documentation for more information.

4. Click **Cancel** to exit the window; note that clicking **Cancel** before clicking on the **Apply** button will close the window without saving any changes.

Chapter 6

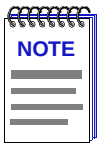
FDDI Applications

Concentrator configuration; connection policy; station list; concentrator performance; FDDI statistics; frame translation

The FDDI menu lets you access windows to view a SmartSwitch 2000's FDDI configuration, connection policy, station list, and performance with respect to each Station Management (SMT) entity present on an installed HSIM-F6 High Speed Interface Module. You can also configure your module's frame translation settings using the Frame Translation window.

The Chassis View for a SmartSwitch 2000 with an installed HSIM-F6 will also offer a FDDI Statistics window, which can be launched from the **Device** menu.

SMT provides the system management services for the FDDI protocols, including connection management, node configuration, error recovery, statistics collecting, and management frame encoding. SMT is comprised of various subcomponent functions, including Connection Management (CMT) and Ring Management (RMT); one SMT entity will be present for the ring connected to the HSIM-F6.



The FDDI menu and associated management windows will only appear if you have an HSIM-F6 installed in an Ethernet SmartSwitch.

The windows that provide information about the FDDI ring connected to the SmartSwitch are:

- **Configuration** — This window displays the current configuration and status of the ring associated with the selected SMT entity.
- **Connection Policy** — This window shows the types of connections between the four FDDI PHY (port) types — A, B, M, and S — that will be allowed by the SMT entity.

- **Station List —** With this window you can see the configuration of the ring on which the SMT entity resides, including number of nodes, node addresses (both Canonical and MAC), node class, and current ring topology
- **Performance** — This window lets you view the number of frames transmitted and received on the ring as detected by the selected SMT entity, along with error and lost frames, and the number of ring initializations.
- **FDDI Statistics** — This window allows you to view various traffic-related statistics for each SMT entity present on the device.

To access FDDI information (except FDDI Statistics):

1. In the Chassis View window, click on the **FDDI** menu option to display the FDDI menu. Select the Station Management (**SMT**) entity that you want to monitor to reveal the following FDDI menu (Figure 6-1).

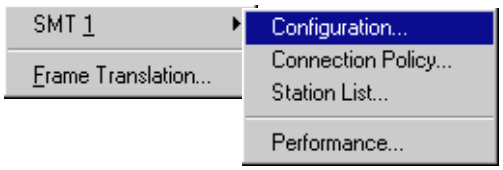


Figure 6-1. The FDDI Menus

2. Click on the desired selection. When you select one of these options, the associated FDDI window will appear.

Note that the title bar of each window will display the index number of the SMT entity whose information is being displayed.

To access the FDDI Statistics window:

1. In the Chassis View window, click on **Device** to display the Device menu.
2. Click on **FDDI Statistics**.

Concentrator Configuration

The Concentrator Configuration window, Figure 6-2, informs you about the configuration and operating state of the FDDI ring associated with the selected SMT entity, and displays parameters relating to ring initialization.

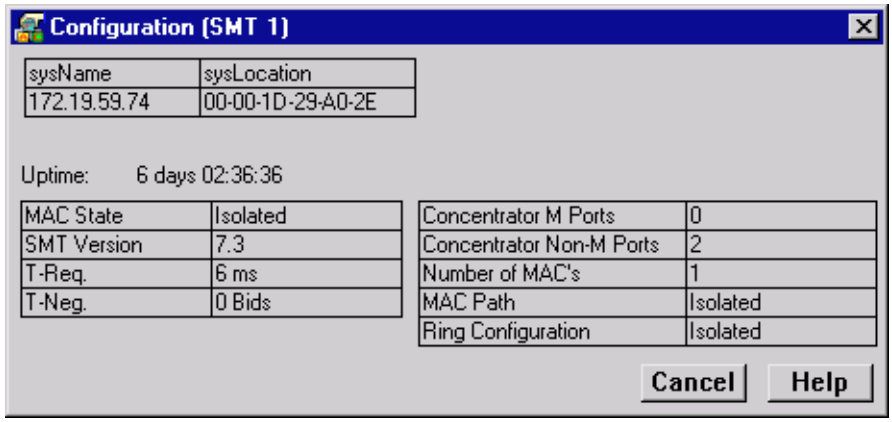


Figure 6-2. The Concentrator Configuration Window

MAC State

This field indicates the current state of the MAC on the FDDI ring associated with the selected SMT entity. The RMT component of SMT monitors MAC operation and takes actions necessary to aid in achieving an operational ring. As described by the FDDI Station Management (SMT) Draft Proposed American National Standard, RMT occurs on a per-MAC basis and aids in the detection and resolution of failures, such as stuck beaconing and the presence of duplicate addresses.

Not Available	There is no MAC on the FDDI ring associated with this SMT entity, or the selected SMT entity is not attached to the main ring through the backplane FNB A and B ports.
Ring-Op	The ring is functioning normally. While in this state, the MAC being managed is part of an operational FDDI ring.
Isolated	SMT has just initialized RMT or RMT has entered this state during a path test (trace) after ring beaconing; RMT is not aware of the ring path or state.
Non-Op	The MAC being managed by the selected SMT is participating in ring recovery; the ring is not operational.
Detect	The claim (beacon) process of the FDDI ring protocol has exceeded one second. There may be a problem on the ring; any duplicate address conditions are being detected. In this state, the ring is still alive, but no data is being transmitted.

Non-Op-Dup	The ring is not operational; the address of the MAC under control of the SMT entity has been found to duplicate that of another MAC on the ring. The duplicate address condition prevented ring recovery and initialization after a claim and beacon process. This state will not occur unless you are using locally- administered addresses, as factory-set MAC addresses are guaranteed to be unique.
Ring-Op-Dup	The ring is operational; however, the address of the MAC under control of the SMT entity has been found to duplicate that of another MAC on the ring. Corrective actions will be attempted before the duplicate address condition causes ring initialization to fail after the claim and beacon recovery process. Like Non-Op-Dup, this state will not occur unless you are using locally-administered addresses.
Directed	The beacon process did not complete within seven seconds. The selected SMT has directed the controlled MAC to send beacon frames to notify the other stations that a serious problem exists on the ring, and a Trace state is soon to follow.
Trace	A problem exists on the ring which could not be corrected during the beaconing process, and a Trace has been initiated. During a Trace (or Path Test), the SMT sends a signal that forces its nearest upstream neighbor to remove from the ring and conduct a self-test. If the ring does not recover, each subsequent upstream station will be forced to remove from the ring and conduct self-tests until the problem has been corrected. While the test is being conducted, ring management re-enters the isolated state.

SMT Version

Displays the HSIM-F6's operational Station Management (**SMT**) version. SMT provides the system management services for the FDDI protocols, including connection management, node configuration, error recovery, and management frame encoding. SMT frames have a version ID field that identifies the structure of the SMT frame Info field. The version number is included in the SMT frame so that a receiving station can determine whether or not its SMT version is able to communicate with the SMT version of another station. Knowing the version number allows the stations to handle version mismatches. Each FDDI station supports a range of SMT versions. The supported version range is identified within the *ietf-fddi* MIB by two *smtTable* attributes: *snmpFddiSMTLoVersionId* and *snmpFddiSMTHiVersionId*. If a received frame is not within the supported version range, the frame is discarded.

T-Req. (Requested Target Token Rotation Time)

The token rotation time bid made by the selected SMT entity during ring initialization. Each station detecting that the ring must be initialized begins a claim token process and issues a stream of Claim Frames, which negotiate the value assigned to the Target Token Rotation Time (TTRT). The information field of these frames contains the issuing station's bid for the value of TTRT. Each claiming station inspects incoming Claim frames (from other issuing stations) and either continues its own bid (and removes the competing Claim Frame from the ring) or defers (halts transmission of its own bid and repeats the competing bid) according to the following hierarchy of arbitration:

- A Claim Frame with the lowest TTRT bid has precedence.
- If the values of TTRT are equal, the frame with the longest source address (48 vs. 16 bits) has precedence.
- If both TTRT value and source address length are equal, the frame with the highest address has precedence.

The HSIM-F6 is shipped with a T-Req = 83 msec (earlier versions of firmware) or 6 msec (later firmware versions). T-Req is stored within the MIB in units of nanoseconds (one billionth of a second) rather than milliseconds (one thousandth of a second); your management application converts nanoseconds to milliseconds for display purposes. You can use any SNMP Set Request tool to edit the T-Req value; just remember that you must enter your value in nanoseconds, rather than milliseconds.

T-Neg. (Negotiated)

The winning time negotiated in the ring initialization sequence.

Concentrator M Ports

This field displays the number of Master (M) ports on the modular concentrator controlled by the HSIM-F6. A Master port is a port that provides a connection for Single Attachment Station (SAS) devices to the FDDI network.

Concentrator Non-M Ports

This field displays the number of non-Master ports (A, B, or S ports) on the modular HSIM-F6 concentrator.

Number of MACs

The number of Media Access Control entities present in the HSIM-F6, indicating the number of ring port pairs. For the HSIM-F6, this number will be 1.

MAC Path

Indicates which FDDI ring the HSIM-F6 MAC is attached to:

- **Primary 1** indicates that the Primary 1 FDDI ring is being used.
- **Secondary 1** indicates that the Secondary 1 FDDI ring is being used.
- **Primary 2** indicates that the Primary 2 FDDI ring is being used.

- **Secondary 2** indicates that the Secondary 2 FDDI ring is being used.
- **Local** means that the MAC is connected to one or more nodes but is not connected to the dual ring.
- **Isolated** means that the MAC has no connection to the ring or other concentrator ports.
- **Unknown** or **?** indicates that your management application cannot determine the MAC path for the HSIM-F6.

Ring Configuration

The current configuration of the MAC and physical layers of the A and B ports.

Connection Policy Window

The SMT Connection Policy of an FDDI concentrator determines which types of connections are allowed among the four FDDI port types: A, B, M (Master), and S (Slave). FDDI protocol forbids Master—>Master connections; all other connection types are legal, although some are considered to be undesirable.

The Connection Policy window, Figure 6-3, lists potential connection types in a "Reject X-Y" format, where **X** represents a port on the HSIM-F6, and **Y** represents the attaching node. An checkmark in the check box next to a Connection Policy indicates that it is an illegal connection.

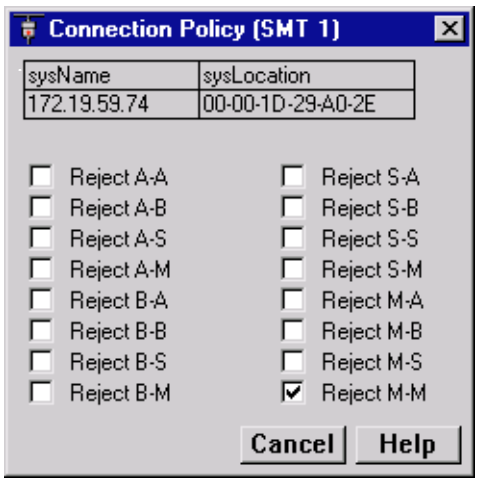


Figure 6-3. The Connection Policy Window

The following table summarizes the FDDI connection rules:

Table 6-1. FDDI Connection Rules

	A	B	S	M
A	V, U	V	V, U	V, P
B	V	V, U	V, U	V, P
S	V, U	V, U	V	V
M	V	V	V	X

V — valid connection
X — illegal connection
U — undesirable (but legal) connection
P — valid, but when both A and B are connected to M ports (a dual-homing configuration), only the B connection is used.

Though technically legal under FDDI connection rules, undesirable connections will cause a twisted or wrapped ring.

Each device has its own connection policy; however, when two devices attempt to connect, their combined established connection policies dictate the connections that will be allowed. In an attempted connection between two nodes, the most lenient policy will determine whether the connection (as long as it is legal) can be made. For example, if two FDDI nodes attempt an A—>A connection, and this connection is not allowed at one FDDI node but allowed at the other, the connection would be accepted. If the connection policy at both nodes disallows the connection, the connection will be rejected.

This is a read-only window; you currently cannot edit the HSIM-F6's connection policy directly from this window.

You can use any SNMP Set Request or MIB tool to edit the Connection Policy for your device by setting the ***fddimibSMTConnectionPolicy*** *MIB OID (part of the MIBII FDDI Transmission MIB (RFC1512).* ***fddimibSMTConnectionPolicy*** *is simply a 16-bit integer value (ranging from 32768 to 65535) that corresponds to the connection policy (in the "Reject X-Y" format, where X represents a port on the FDDI Switch Module, and Y represents the attaching node).*

To set the connection policy for the device, total the bit values corresponding to the desired connection policy according to the table below, and then use your SNMP Set Request or Mib tool to set the value for the appropriate SMT index. For example, to set a connection policy that disallowed the undesirable A-A or B-B connections you would set the ***fddimibSMTConnectionPolicy*** *MIB OID to 32,801: 32,768 (reject M-M, required) + 32 (reject B-B) + 1 (reject A-A).*

Policy	*Power*
rejectA-A	2^0 *(1)*
rejectA-B	2^1 *(2)*
rejectA-S	2^2 *(4)*
rejectA-M	2^3 *(8)*
rejectB-A	2^4 *(16)*
rejectB-B	2^5 *(32)*
rejectB-S	2^6 *(64)*
rejectB-M	2^7 *(128)*
rejectS-A	2^8 *(256)*
rejectS-B	2^9 *(512)*
rejectS-S	2^{10} *(1,024)*
rejectS-M	2^{11} *(2,048)*
rejectM-A	2^{12} *(4,096)*
rejectM-B	2^{13} *(8,192)*
rejectM-S	2^{14} *(16,384)*
rejectM-M	2^{15} *(32,768 — a permanently set value for this bit)*

Station List

The Station List illustrates the configuration of the HSIM-F6 managed ring, including number of nodes on the ring, node addresses (both Canonical and MAC), node class, and ring topology.

The Station List provides the following information about the HSIM-F6 controlled ring:

Number of Nodes

The number of stations inserted into the FDDI ring to which the HSIM-F6 MAC is connected.

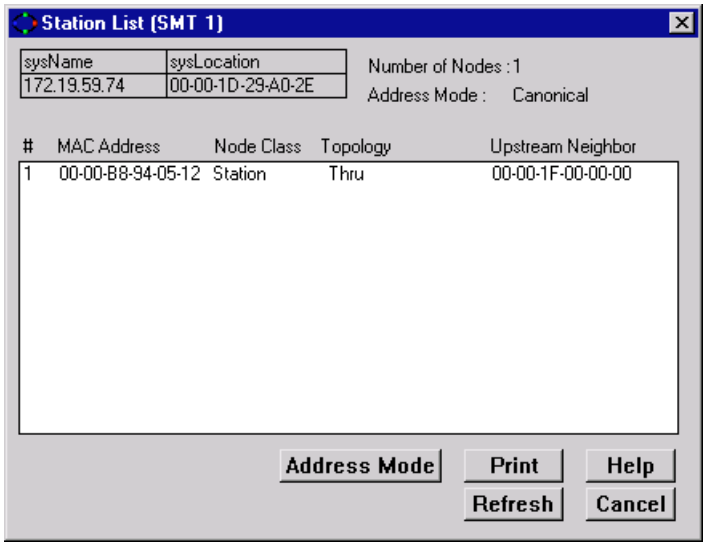


Figure 6-4. The Station List Window

Address Mode

Displays the current mode being used to display the addresses of the devices in the Station List. The two possible modes are Canonical (FDDI) or MAC (Ethernet).

To change the current Address Mode, click on the **Address Mode** button at the bottom of the window. The current address mode will change in the Address Mode field and the Stations panel.

Stations Panel

The Stations Panel displays a list of the stations on the ring to which the selected SMT is connected, in ring sequence from the MAC, along with each station's node class and current topology.

The information displayed in the Station List is static once the window is opened; for updated information, click on the **Refresh** button.

If the number of nodes exceeds the panel size, scroll bars will appear in the list box that will allow you to scroll through the station list to view the node of interest.

Information provided in the Stations Panel includes:

#

An index number assigned to each station that indicates its position on the ring in relation to the HSIM-F6. The monitored HSIM-F6 is always 1. Note that stations are listed in reverse index order, with the HSIM-F6 appearing last on the list.

MAC Address
Displays the manufacturer-set MAC address of the node inserted into the ring. MAC addresses are hard-coded into the device and are not configurable.

Node Class
Displays the type of ring device. Possible values are:

Station	Indicates an FDDI node capable of transmitting, receiving, and repeating data.
Concentrator	Indicates an FDDI node that provides attachment points to the ring for stations that are not directly connected to the dual ring.

Topology
Indicates the node's MAC configuration topology.

Upstream Neighbor
Displays hardware address (in Canonical or MAC format, as currently selected) of each node's upstream neighbor.

FDDI Performance

The FDDI Performance window, Figure 6-5, provides graphical and numeric performance statistics for the HSIM-F6, including:

- Transmit Frames
- Receive Frames
- Frame Errors
- Lost Frames
- Ring Ops

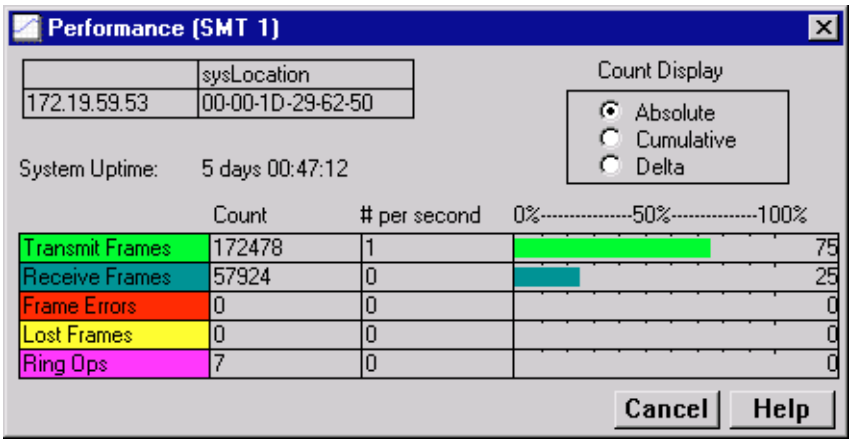


Figure 6-5. The Concentrator Performance Window

Statistics are displayed in three ways:

- By count (i.e., the number detected of each for the selected interval).
- By rate (i.e., the number of each per second, as averaged over the selected interval).
- Graphically, as a percentage of each with respect to total network load processed by the HSIM-F6 during the last interval.

You can view the concentrator performance for three different intervals:

- Absolute – Counts recorded since the device was last started.
- Cumulative – Counts recorded since the Concentrator Performance window was opened.
- Delta – Counts recorded during a single polling interval that is set for NetSight Element Manager (refer to the ***User's Guide***).

To change the interval, click to select the desired radio button in the Count Display panel in the top right hand corner of the window.

Available statistics are:

Transmit Frames
The number of frames transmitted by the HSIM-F6's MAC during the selected interval.

Receive Frames
The number of frames received by the HSIM-F6's MAC during the selected interval.

Frame Errors
The number of error frames detected by the HSIM-F6's MAC during the selected interval that had not been detected previously by other stations. Error frames may include frames with an invalid Frame Check Sequence (FCS), with data length errors, or with internal errors that prevent the MAC from transferring the frame to the Logical Link Control (LLC) layer.

Lost Frames
The number of frames detected by the HSIM-F6's MAC during the selected interval that have an unknown error, so their validity is in doubt. When the HSIM-F6's MAC encounters a frame of this type, it increments the Lost Frame counter and strips the remainder of the frame from the ring, replacing it with idle symbols.

Ring Ops
The number of times the ring has entered the "Ring Operational" state from the "Ring Not Operational" state during the selected interval. This counter updates when the HSIM-F6's MAC informs Station Management (SMT) of a change in Ring Operation status.

FDDI Statistics

The FDDI Statistics window displays traffic statistics for the HSIM-F6's SMT entity, including the number of frames and kilobytes per second (averaged over a defined poll rate), the peak number of kilobytes per second, and the module's bandwidth utilization (expressed as a percentage) for the current poll interval.

To access the FDDI Statistics window:

1. In the Chassis View window, click on **Device** to display the Device menu.
2. Click on **FDDI Statistics**. The FDDI Statistics window (Figure 6-6) will appear.

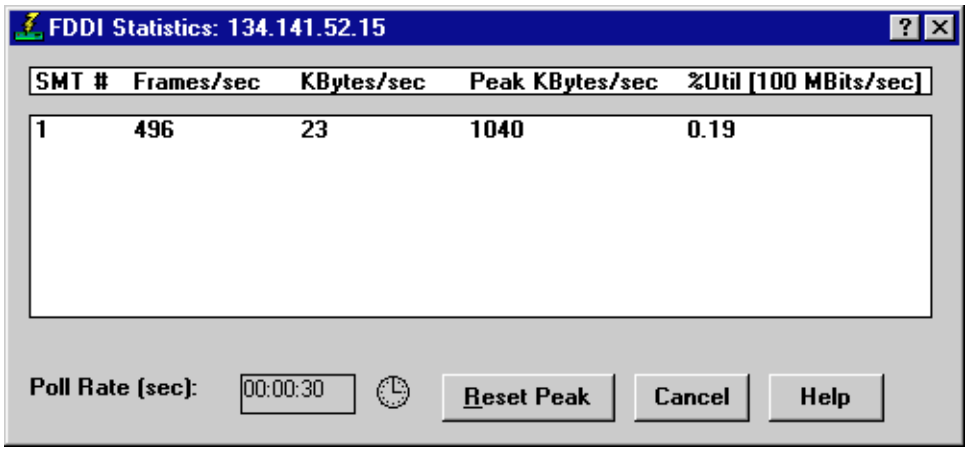


Figure 6-6. The FDDI Statistics Window

The FDDI Statistics window displays the following information for the module:

SMT#
This field displays the index number of Station Management (SMT) entity for the HSIM-F6.

Frames/sec
The number of frames / second (averaged over the specified poll interval) transmitted by the indicated SMT.

KBytes/sec
The number of kilobytes / second (averaged over the specified poll interval) transmitted by the indicated SMT.

Peak KBytes/sec
The peak number of kilobytes / second transmitted by the indicated SMT, as detected over all polling intervals since monitoring began (i.e., since the FDDI Statistics window was first opened).

%Util
The percentage of utilization of available bandwidth by the indicated SMT over the current poll interval; the percentage is calculated by dividing the actual number of transmitted bytes / sec into the maximum number of bytes / sec that could be transmitted (125,000,000 bytes / sec potential on a 100 Megabit / second ring).

Setting the FDDI Statistics Poll Rate

1. Click on the clock symbol ( ) next to the **Poll Rate (sec)** text box. The New Timer Interval text box, Figure 6-7, will appear.

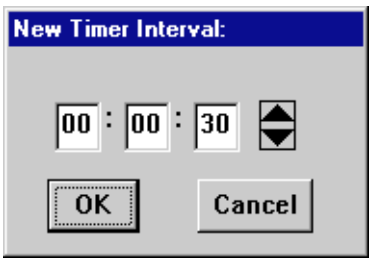


Figure 6-7. New Timer Interval Text Box

2. Highlight the **hour** field in the New Timer Interval text box and enter a new hour value or use the arrow keys to scroll to change the hour, as desired. The time is given in a 24-hour hh:mm:ss format.
3. Repeat step 2 to change the **minutes** and **seconds** fields, as desired.
4. Click **OK** when you are finished entering new information. The new Poll Rate you have set is now entered.

The FDDI Statistics window will refresh, and the new time interval will take effect immediately.

Configuring FDDI Frame Translation Settings

The HSIM-F6 interface must be configured to translate packets from an FDDI frame format to an Ethernet frame format (and vice versa) when bridging packets between FDDI and Ethernet networks. The Frame Translation window lets you set the parameters for frame translation.

To access the FDDI Translation window (Figure 6-8):

1. In the Chassis View window, click on **FDDI** to display the FDDI menu.
2. Click on **Frame Translation**.

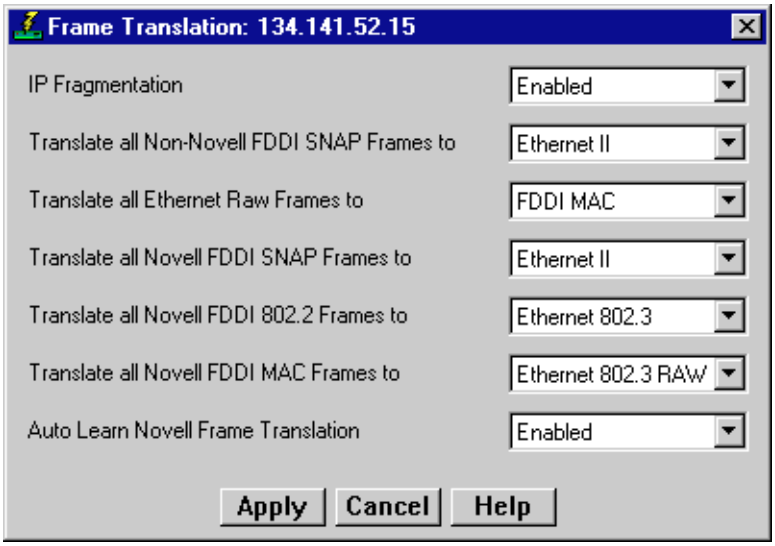


Figure 6-8. The Frame Translation Window

Information about Ethernet and FDDI Frame Types

There are four frame types which can be transmitted on an IEEE 802.3/Ethernet network – **Ethernet II**, **Ethernet 802.2**, **Ethernet 802.3** (or Raw Ethernet), and **Ethernet SNAP**; there two frame types which can be transmitted on an FDDI network: **FDDI 802.2** and **FDDI SNAP**. Each of these frame types is described in more detail in the sections that follow. Bridges connecting IEEE 802.3/Ethernet LANs to an FDDI ring have to provide frame translation, as there are addressing and frame format differences between the two network topology types.

For an Ethernet frame format to be forwarded onto an FDDI network, the Length (IEEE 802/SNAP) or Type (Ethernet II) field must be removed (along with any frame padding), an FDDI Frame Control field must be added, the bit-order of the address fields must be reversed, and the frame's CRC field must be recomputed.

In most instances, the IEEE 802.3/Ethernet frame format is translated automatically into the appropriately corresponding FDDI frame format. Ethernet 802.2 frames are translated to FDDI 802.2 frames; Ethernet II frames are translated to FDDI SNAP frames; non-AppleTalk Ethernet SNAP frames are translated to FDDI SNAP frames; and AppleTalk Ethernet SNAP frames are translated to FDDI SNAP frames (AppleTalk format).

However, because Ethernet Raw frames do not have a Type or Length field, and can't be automatically translated onto an FDDI network, you must select the appropriate translation method to an FDDI frame format (for transmitting to FDDI stations or for bridging back to an Ethernet network).

If the frame is exiting the FDDI ring through another FDDI/Ethernet bridge, the FDDI frame must be converted back into an IEEE 802.3/Ethernet frame. As there are four potential Ethernet frame types to which the two FDDI frame types can be translated, you must determine which translation options you want in effect — depending on which network protocols and applications are being run on the destination network.

In addition, there are frame size differences between FDDI (which allows a maximum frame size of 4500 bytes) and Ethernet frames (1518 byte maximum, excluding preamble), so FDDI frames may need to be fragmented before being bridged onto an Ethernet network.

The Frame Translation window lets you set the parameters for frame translation and fragmentation when Ethernet traffic needs to traverse an FDDI ring. The frame types that you select for translation will depend on which higher-layer communications protocols and software you are running on the network segments connected to your Ethernet-to-FDDI bridge. Each frame type and its usage is described below.

Ethernet Frames

The HSIM-F6 supports translation of the following four Ethernet frame types:

Ethernet II

Ethernet II is the Novell NetWare designation for the basic Ethernet frame type (also commonly referred to as Ethernet or Ethernet DIX). This frame format has an Ethernet II MAC header with a two byte Ethernet **Type** field. The Type field contains a protocol ID which indicates the upper layer protocol (e.g., XNS, DECnet, TCP/IP, etc.) used in the Data field of the packet. Most current transmission protocols, including TCP/IP, use the Ethernet II frame format, as do networks running Apple's AppleTalk 1 protocol and Digital's DECnet protocol.

Note that the Type field of an Ethernet II frame will always have a decimal value greater than 1500, so that it can be differentiated from the Length field of Ethernet 802.2 frames (described below).

Ethernet 802.2

The Ethernet 802.2 frame format is the IEEE 802.3 formalization of the original Ethernet frame format. This frame format is similar to the Ethernet II frame format, except that the two byte Type field is eliminated and replaced with a two byte **Length** field, and an 802.2 LLC header is encapsulated within the 802.3 frame. This LLC header contains the destination and source addressing information for the LLC frame (DSAP and SSAP), and a one byte Control field (the LSAP – or LLC Service Access Point value) which provides the frame's protocol ID. Ethernet 802.2 packets are differentiated from Ethernet II packets because the Length field will always have a decimal value of 1500 or less (since the data field in Ethernet frames cannot be greater than 1500 bytes), and the Ethernet II Type field will always be greater than 1500 decimal.

This is the default frame type for Novell NetWare software version 3.12 and beyond; it is also used for OSI packets on IEEE 802.x LAN networks.

Ethernet 802.3 (Ethernet Raw)

The Ethernet 802.3 frame format has an 802.3 MAC layer header (as do Ethernet 802.2 frames); however, it does not contain an 802.2 LLC header. Instead, Novell IPX is fixed within the packet as the network layer protocol. This frame type – also known as **Raw 802.3** – is the default frame type for Novell NetWare software before version 3.11. Since these frames do not carry the 802.2 header, they do not conform to the IEEE 802.3 specification. If you are using the Ethernet 802.3 Raw frame format, you should consider upgrading your Novell NetWare software to ensure interoperability with other communications protocols (unless your current network is not likely to be upgraded, and has no interoperability problems).

IPX packets with checksums which provide data integrity (a feature of newer Novell NetWare releases) cannot be transmitted on Ethernet 802.3 networks. Note also that a single Ethernet can carry both Ethernet 802.3 and Ethernet 802.2 traffic simultaneously. The Novell server software will treat the two frame types as two logical networks (and function as an IPX router between the two networks).

Ethernet SNAP

To allow for proprietary protocols, such as IBM's SNA protocol, the **Ethernet** SNAP frame was created. This frame format extended the Ethernet 802.2 packet by improving the frame's byte alignment, and by allowing further protocol identification than the one byte LSAP protocol identifier of Ethernet 802.2 frames (which is reserved for standard protocols). Ethernet SNAP packets have an LSAP protocol ID of hex AA, indicating that they contain a **SNAP** (Subnetwork Access Protocol) packet. A SNAP packet, encapsulated within the Ethernet 802.2 packet, has a five byte SNAP header which is simply a five byte protocol identifier. The first three bytes of the header indicate the Organizationally Unique Identifier (OUI) – or the authority assigning the protocol ID – and the last two bytes indicate the protocol according to that authority. Note that for most protocols, the OUI is 0-0-0, and the type identifier is the standard Ethernet protocol ID. Although most Ethernet transport protocols use the Ethernet II frame format, the AppleTalk II protocol uses Ethernet SNAP (AppleTalk has its own unique OUI).

FDDI Frames

There are two legal FDDI data frame types:

FDDI 802.2

The FDDI 802.2 frame type has two headers: the FDDI header (which includes the Frame Control field that indicates the class of frame, length of the address field, and the type of FDDI frame), and the 802.2 header.

FDDI SNAP

The FDDI SNAP frame type has an FDDI header with a Frame Control field that provides FDDI framing information, and the 802.2 LLC header with FDDI Frame Control, a SNAP LSAP identifier, and a five byte protocol identifier.

There is no FDDI equivalent for Ethernet 802.3 Raw frames or Ethernet II frames. Enterasys' Ethernet / FDDI bridges will automatically translate Ethernet II frames into FDDI SNAP frames, by identifying it as a SNAP frame in the LLC header, and inserting a SNAP header with the Ethernet Type field.

By default, Enterasys' Ethernet-to- FDDI bridges will translate an 802.3 Raw frame into an **FDDI MAC** frame – although you can use the FDDI Frame Translation window to alter the default translation. The FDDI MAC frame is an FDDI frame type that is defined for internal use by the MAC layer, and which is not passed to higher layer communications protocols on the datalink layer. Any 802.3 Raw frame translated into FDDI MAC will be recognized as such by other Ethernet / FDDI bridges inserted in the ring, and will be forwarded onto the target Ethernet segment as an 802.3 Raw frame.

FDDI Frame Translation Options

The FDDI Translation window lets you select which translation methods you want enforced when translating frames from an FDDI frame format into an Ethernet frame format, and when translating Ethernet Raw frames into FDDI frames. It also lets you choose whether to allow fragmentation of IP datagrams into smaller datagrams, and enable or disable the Auto Learn Novell Frame Translation option.

To set frame translation parameters:

1. Click on the selection boxes of interest (described below), and select the desired translation options.
2. Click **Apply** to save your new frame translation settings at the device, or click **Cancel** to restore the last saved options.

IP Fragmentation

The IP Fragmentation selection box lets you specify frame fragmentation parameters. FDDI traffic may need to be split, or fragmented, into two, three, or four smaller frames to be successfully transmitted on an Ethernet network. For fragmentation to be allowed, the frame must be an FDDI SNAP frame with an OUI of 00-00-00 (indicating TCP / IP) and an IP protocol type identifier (08-00). Possible options are **Enabled** (allow IP fragmentation – the default) or **Disabled** (prevent IP fragmentation, and discard frames over 1518 bytes).

Translate all Non-Novell FDDI SNAP frames to

This selection box lets you set the translation parameters for non-Novell FDDI SNAP frames. Possible options are **Ethernet II** (the default, which you should use when bridging to most TCP / IP networks) or **Ethernet SNAP** (which you should use when bridging to an AppleTalk environment on Ethernet).

Translate all Ethernet Raw frames to

This selection box lets you set the translation parameters for Ethernet Raw (Ethernet 802.3) packets. Ethernet Raw frames are used on networks running the IPX protocol on Novell NetWare versions prior to 3.12. Possible options are **FDDI**

802.2, **FDDI SNAP** (generally used when bridging to an AppleTalk environment on an FDDI ring), or **FDDI MAC** (the default option, which translates the frame into an FDDI MAC frame – which will not recognized as a data frame on an FDDI ring, but will be recognized by an Enterasys Ethernet / FDDI bridge).

Translate all Novell FDDI SNAP frames to

This selection box lets you set the translation parameters for Novell IPX FDDI SNAP frames. Possible options are **Ethernet II** (default, for most TCP / IP traffic), **Ethernet SNAP** (AppleTalk networks), **Ethernet 802.3** (some NetWare 3.12+ or other networks running an ISO / OSI protocol stack), or **Ethernet 802.3 Raw** (NetWare 3.11 and earlier networks).

Translate all Novell FDDI 802.2 frames to

This selection box lets you set the translation parameters for Novell IPX FDDI 802.2 frames. Possible options are **Ethernet II**, **Ethernet SNAP**, **Ethernet 802.3** (default), or **Ethernet 802.3 Raw**.

Translate all Novell FDDI MAC frames to

This selection box lets you set the translation parameters for Novell IPX FDDI MAC frames (i.e., received from a NetWare 3.11 or earlier network, and translated into FDDI MAC frames). Possible options are **Ethernet II** (most TCP / IP networks), **Ethernet SNAP** (AppleTalk Networks), **Ethernet 802.3** (some NetWare 3.12+ and other networks running an ISO / OSI protocol stack), or **Ethernet 802.3 Raw** (default – NetWare 3.11 or earlier networks).

Auto Learn Novell Frame Translation

Some of Enterasys' FDDI / Ethernet bridges can automatically learn the appropriate frame translation type by the source address received at the Ethernet interface. If this option is enabled, Novell IPX frames destined to a previously learned source address will be translated to the appropriate frame type for that address (as determined by its previously transmitted frames). If the destination address is unknown, the default frame translation will be used for the frame. Possible options are **Enabled** or **Disabled**.

Chapter 7

ATM Configuration

Viewing connection data; configuring Permanent Virtual Circuits (PVCs); adding and deleting connection entries

The ATM Connections option is available when you have an HSIM-A6DP installed and enabled in your SmartSwitch 2000. The ATM HSIM-A6DP provides the connectivity that allows you to merge ATM network segments with traditional LAN technologies.

An ATM network uses two types of virtual channels, or circuits: Switched Virtual Circuits, or SVCs, and Permanent Virtual Circuits, or PVCs. SVCs are created and dismantled dynamically on an as-needed basis, and require no management definition; PVCs, however, must be manually configured. The Current ATM Connections window provides the means for accomplishing these configurations.

Accessing the ATM Connections Window

To access the ATM Connections window from the Chassis View:

1. Click on **Device** on the Chassis View menu bar to access the Device menu.
2. Click on **ATM Connections**. The Current ATM Connections window, Figure 7-1, opens.

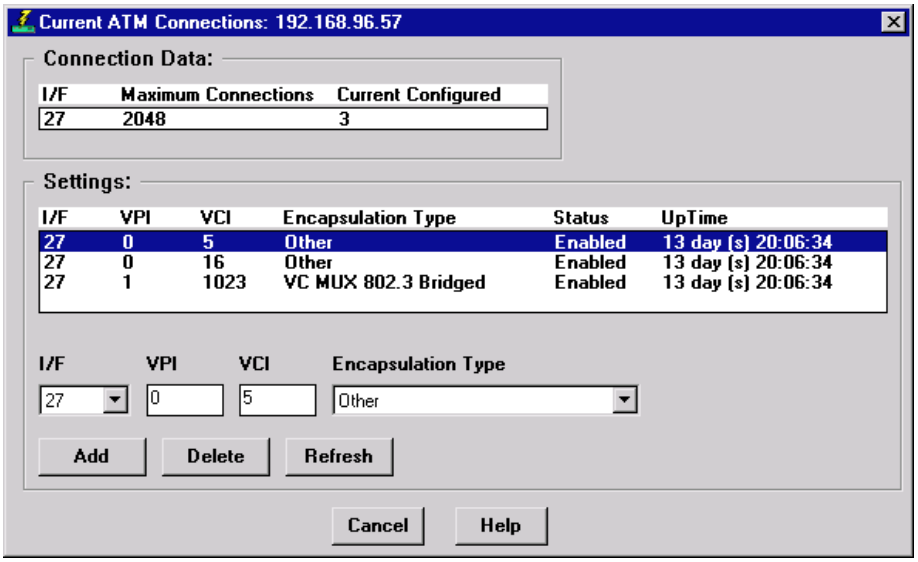


Figure 7-1. Current ATM Connections Window

The Current ATM Connections window provides the following information about the device's ATM connections:

Connection Data

The Connection Data fields provide the following information about each ATM interface available on the device:

I/F	Displays the index number assigned to each ATM interface present on the selected module. The HSIM-A6DP will provide a single ATM interface, indexed 27.
Maximum Connections	Displays the maximum number of connections allowed by current device firmware.
Current Configured	Displays the number of Permanent Virtual Circuits, or PVCs, currently configured.

Settings

The Settings portion of the window contains a list box which displays information about each of the currently configured PVCs, as well as the fields used to configure new connections:

I/F	The device interface on which the PVC was configured.

VPI	Displays the Virtual Path Identifier assigned to the connection. Virtual Path Identifiers are used to group virtual connections, allowing for channel trunking between ATM switches. Each VPI can be configured to carry many different channels (designated by VCIs) between two points.
VCI	Displays the Virtual Channel Identifier assigned to the connection; allowable values are 0 - 1023 *for each VPI*. Each assigned VCI must be unique within its defined VPI: for example, you can assign a VCI of 14 as many as four times: once with a VPI of 0, once with a VPI of 1, and so on. Remember, it is the combined VPI and VCI designations assigned to a channel that creates the grouping of virtual connections.
Encapsulation Type	Displays the method used to encapsulate LAN packets on the selected circuit. Current versions of HSIM-A6DP firmware use 802.3 VC-based multiplexing for bridging protocols (designated VC MUX 802.3 Bridged); future versions will add support for ATM Forum LAN Emulation and SecureFast Switching. You may also see some connections assigned a type of “other”; these are default connections that cannot be modified or deleted.
Status	Displays the current administrative status of the connection: enabled or disabled. In current versions of firmware, all connections are enabled by default, and cannot be disabled.
UpTime	The length of time the selected connection has been enabled.

Add

Selecting the **Add** button either adds a new connection or modifies an existing one, using the parameters entered in the fields below the list box. A confirmation window opens for both additions and modifications.

Delete

Selecting the **Delete** button deletes the selected connection; a confirmation window requires that you confirm the deletion.

Refresh

Selecting **Refresh** refreshes the connection information displayed in the window.

Configuring Connections

Adding a New Connection

To configure new Permanent Virtual Circuits (PVCs), enter the following information in the text fields which appear just below the settings list box:

1. In the **I/F** text box, click on the down-arrow to the right of the text field, and select the interface for which you wish to configure a connection. All available ATM interfaces will be listed in this menu.
2. In the **VPI** text box, enter the Virtual Path Identifier you wish to assign to this connection. Allowable values are 0 to 3; remember, the VPI you assign will be used to group virtual connections, allowing for channel trunking between ATM switches.
3. In the **VCI** text box, enter the Virtual Channel Identifier you wish to assign to this connection. Allowable values are 0 to 1023 *for each VPI*. For example, you could assign the same channel identifier — say, 25 — as many as four times: once with a VPI of 0, once with a VPI of 1, and so on. Again, remember that it is the combination of VPI and VCI that will be used to direct cells through the intermediate switches between the source and destination.
4. In the **Encapsulation Type** field, click on the down arrow located to the right of the field, and select the desired encapsulation type. Current versions of HSIM-A6DP firmware use 802.3 VC-based multiplexing for bridging protocols (designated VC MUX 802.3 Bridged); future versions will add support for additional encapsulation methods.

Selecting any of the other encapsulation types listed in the field's menu will cause a "Set Failed" error when you attempt to add the new connection.

5. Click **Add** to add the new permanent circuit to the ATM interface. The circuit is automatically enabled, and will remain in place until it is manually removed.

Deleting a Connection

To delete an existing PVC:

1. In the connections list box, click to select the connection you wish to delete.
2. Click **Delete**. A confirmation window opens, listing the parameters assigned to the connection and asking you to verify that you wish to delete it. Click on **OK** to proceed with the deletion, or on **Cancel** to cancel.

Chapter 8

HSIM-W87 Configuration

Configuring the T3 interface; configuring T1 connections; setting priority IP Addresses

The HSIM-W87 is a High Speed Interface Module that provides Wide Area Network (WAN) services. The HSIM has a DS3 interface (T3), providing up to 28 separate DS1 connections (T1). The HSIM-W87 design provides WAN connectivity to any SmartSwitch that supports HSIM connections.

The HSIM-W87 operates in a switching/bridging mode. With minimal user configuration, the HSIM-W87 forwards data packets received by the host out the logical DS1 interfaces (the T1 lines). It will also forward packets received on the DS1 interfaces to or through the host. Up to 16 IP addresses can be configured for priority transmission across the HSIM-W87.

The HSIM-W87 is configured using three windows: the T3 Configuration window, the T1 Configuration window, and the IP Priority Configuration window. These windows are explained in the following sections.

The T3 Configuration Window

You can set certain variables for the DS3 interface using the T3 Config window. To access the T3 Config window:

1. Click on the T3 port to access the **Port** menu. (To determine which port is a T3, select I/F Type from the Port Status menu. The T3 port will be labeled “DS-3”.)
2. Select **HSIM W87 Config (T3)**. The T3 Config window, Figure 8-1, opens.

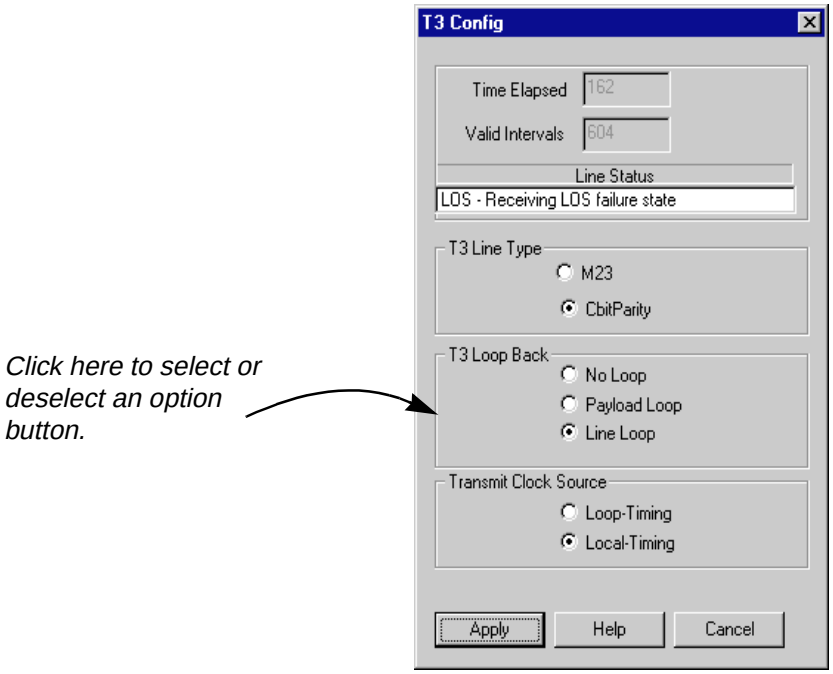


Figure 8-1. The T3 Config Window

The T3 Config window provides the following information about the device's T3 configuration and allows you to set certain values:

Time Elapsed
Indicates the number of seconds that have elapsed since the beginning of the near end current error-measurement period. To update this field you must close and reopen the window.

Valid Intervals
Displays the number of previous near end intervals for which valid data was collected. The value will be 96 unless the interface was brought online within the last 24 hours, in which case the value will be the number of complete 15-minute near end intervals since the interface has been online.

NOTE

*For some firmware versions, the **Valid Intervals** field may display an incorrect value.*

Line Status
This field indicates the line status of the interface. It contains loopback state and failure state information. Scroll to view all of the status information, if necessary.

T3 Line Type
Select the type of DS3 or C-bit application implementing this interface: **M23** or **CbitParity**. The type of interface affects the interpretation of the usage and error statistics.

T3 Loop Back
Select the loopback configuration of the T3 interface. Options are:

No Loop	Not in a loopback state. A device that is not capable of performing a loopback on the interface will always have this value.
Payload	The received signal at this interface is looped through the device. Typically the received signal is looped back for retransmission after it has passed through the devices's framing function.
Line Loop	The received signal at this interface does not go through the device, but is looped back out.

Transmit Clock Source
Select the T3 Transmit Clock Source: **Loop-Timing**, which indicates that the recovered receive clock is used as the transmit clock, or **Local-Timing**, which indicates that an internal clock source is used.

To change an option in the T3 Config window:

1. In the **Line Type**, **Loop Back**, and **Transmit Clock Source** sections, click to select the desired option.
2. Click the **Apply** button to set your changes.

The T1 Configuration Window

You can set certain variables for the DS1 connections using the T1 Config window. To access the T1 Config window:

1. Click on the appropriate Module Index to access the Module menu.
2. Select **HSIM W87 Config (T1)**. The T1 Config window, Figure 8-2, opens.

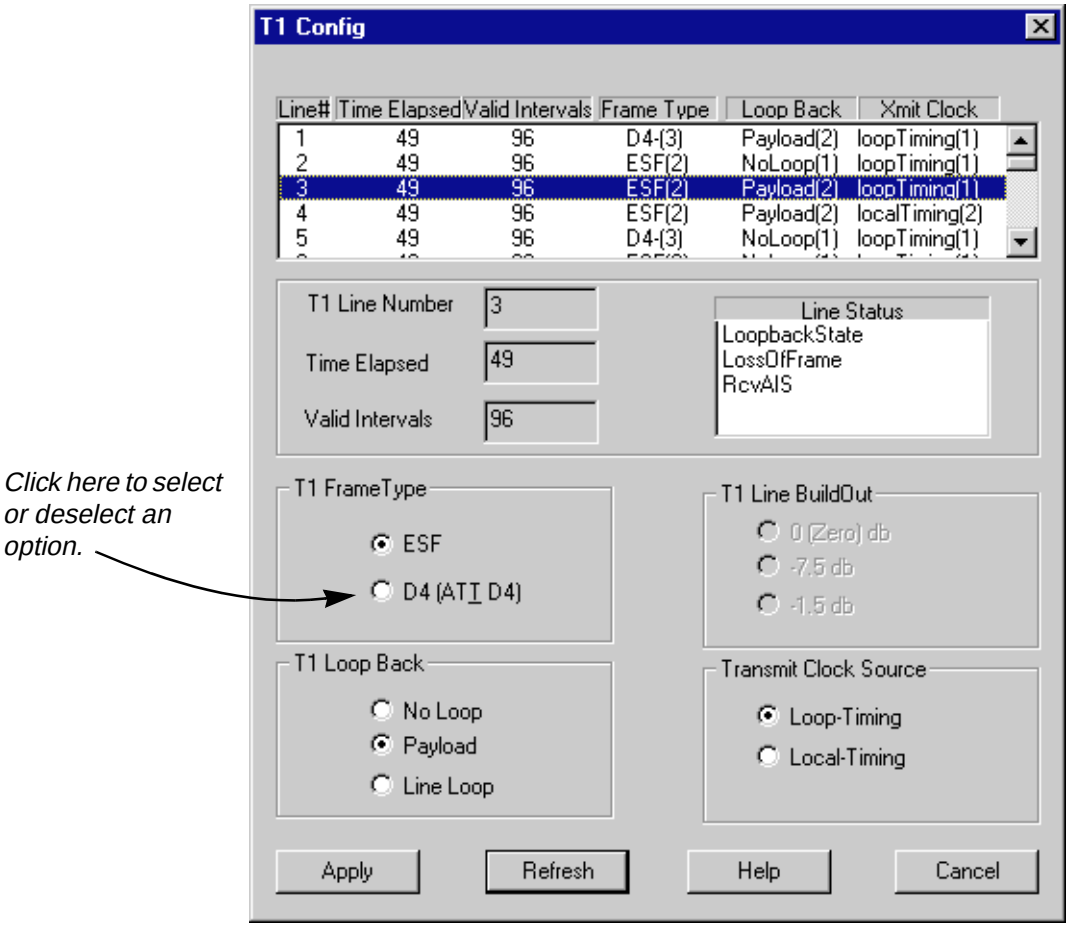


Figure 8-2. The T1 Config Window

At the top of the T1 Config window a list box displays configuration information for each T1 connection (line). When you highlight a specific T1 line by clicking on it, the fields below the list box display the current values for that line, and allow you to change those values.

The following information is displayed for each T1 connection:

T1 Line Number
Displays the unique identifier assigned to each T1 port on the HSIM.

Time Elapsed
Displays the number of seconds that have elapsed since the beginning of the current error-measurement period. To update this field you must click the **Refresh** button or close and reopen the window.

Valid Intervals
Displays the number of previous intervals for which valid data was collected. The value will be 96 unless the interface was brought online within the last 24 hours, in which case the value will be the number of complete 15-minute intervals since the interface has been online.

T1 Frame Type
Displays the type of service you are using over your T1 line. This value should be set according to your WAN service provider's instructions: **ESF** (Extended Super Frame DS1) or **D4** (AT&T D4 format DS1).

T1 Loop Back
Displays the loopback configuration of the T1 interface. Values are:

No Loop	Not in a loopback state. A device that is not capable of performing a loopback on the interface will always have this value.
Payload	The received signal at this interface is looped through the device. Typically the received signal is looped back for retransmission after it has passed through the devices's framing function.
Line Loop	The received signal at this interface does not go through the device, but is looped back out.

Line Status
This field indicates the line status of the interface. It contains loopback, failure, received alarms and transmitted alarm information.

T1 Line BuildOut
Displays the value of the Line Buildout setting. This setting controls the amount of attenuation of the T1 signal. The possible settings are 0 db, -7.5 db, and -15 db. This field is currently **not** supported and will appear grayed out.

Transmit Clock Source
Displays the T1 Transmit Clock Source: **Loop-Timing**, which indicates that the recovered receive clock is used as the transmit clock, and **Local-Timing**, which indicates that an internal clock source is used.

Use the option boxes below the T1 list box to modify your T1 connections:

1. In the list box, click to highlight the T1 connection you wish to configure.
2. In the **Frame Type**, **Loop Back**, **Line BuildOut**, and **Transmit Clock Source** sections, click to select the desired option.
3. Click **Apply** to set your changes. You must click **Apply** after modifying each T1 connection.
4. Click **Refresh** to see your changes reflected in the list box.

Configuring IP Priority

The IP Priority Configuration window allows you to assign priority transmission to up to 16 IP addresses communicating across the HSIM-W87.

To access the IP Priority Config window:

1. Click on the appropriate Module Index to access the Module menu.
2. Select **IP Priority Config**. The IP Priority Config window, Figure 8-3, opens.

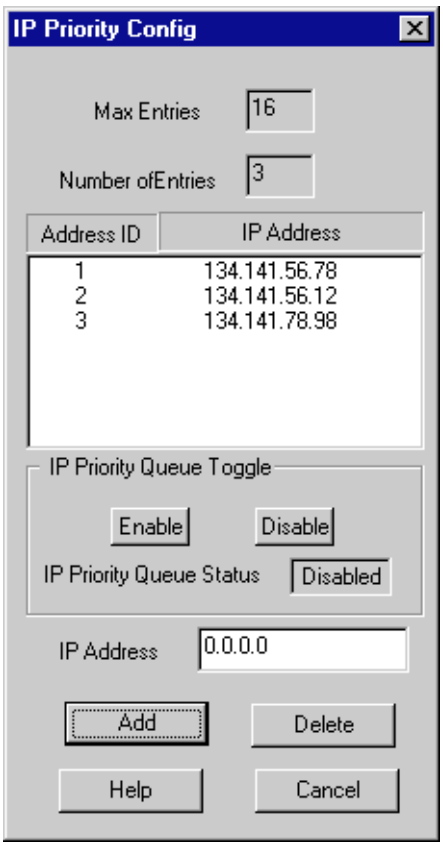


Figure 8-3. The IP Priority Config Window

In the IP Priority Config window there several fields and a list box displaying the current IP addresses that have been configured for priority transmission. The following information is provided in the window:

Max Entries
This is a read-only field that displays the maximum number (16) of Priority IP addresses that can be configured.

Number of Entries

Displays the number of Priority IP addresses currently configured. This number will change each time you add or delete an IP address in the list box.

Below these two fields is a list box displaying the currently configured IP Priority Addresses. Each address is automatically assigned an **Address ID** when it is configured. The lower the ID number, the higher the priority.

IP Priority Queue Status

This read-only field gives you the status (**Enabled** or **Disabled**) of IP Priority configuration. You can change the status using the **Enable** or **Disable** buttons.

To configure IP Priority addresses:

1. In the IP Address field, enter the IP Address you want to configure in the appropriate X.X.X.X format.
2. Click the **Add** button to add the IP Address to the list box. Remember, you can configure a maximum of 16 IP addresses.
3. To delete an IP address, click to highlight the desired IP address in the list box and click the **Delete** button.
4. To enable or disable IP Priority Address configuration, click on the **Enable** or **Disable** button (in the IP Priority Queue Toggle section) as desired. The current status is displayed in the IP Priority Queue Status field.

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